



Infant music perception: Domain-general or domain-specific mechanisms?

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Abstract

We review the literature on infants' perception of pitch and temporal patterns, relating it to comparable research with human adult and non-human listeners. Although there are parallels in relative pitch processing across age and species, there are notable differences. Infants accomplish such tasks with ease, but non-human listeners require extensive training to achieve very modest levels of performance. In general, human listeners process auditory sequences in a holistic manner, and non-human listeners focus on absolute aspects of individual tones. Temporal grouping processes and categorization on the basis of rhythm are evident in non-human listeners and in human infants and adults. Although synchronization to sound patterns is thought to be uniquely human, tapping to music, synchronous firefly flashing, and other cyclic behaviors can be described by similar mathematical principles. We conclude that infants' music perception skills are a product of general perceptual mechanisms that are neither musician species-specific. Along with general-purpose mechanisms for the perceptual foundations of music, we suggest unique motivational mechanisms that can account for the perpetuation of musical behavior in all human societies.

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1. Introduction

In recent years, there has been increasing interest in the biological basis of music (Wallin, Merker, & Brown, 2000; Zatorre & Peretz, 2001) and the possibility of music-specific processing skills (Hauser & McDermott, 2003; Miller, 2000; Peretz & Coltheart, 2003). Some scholars posit “core mechanisms” that enable humans, regardless of musical training, to carry a tune, move in time to music, and respond emotionally to music. Peretz and Coltheart (2003) describe these core mechanisms as a system of modules, each of which is dedicated to the analysis or processing of different aspects of music such as melodic contour, intervals, and rhythm. Other scholars contend that a music faculty evolved through natural or sexual selection (Dissanayake, 2000; Hauser & McDermott, 2003; Miller, 2000). They suggest that music-related skills may have enhanced reproductive fitness in ancestral times by strengthening interpersonal relations or group solidarity.

Biological or modular conceptions of music processing stand in sharp contrast to notions of music as frivolous, its structures governed largely by cultural and economic circumstances (Nettl, 1983; Pinker, 1997) rather than by universal processing dispositions or constraints (Trehub, 2000, 2003a). In a now infamous passage, Pinker (1997) characterizes music as “auditory cheesecake”, with competence in the musical realm dependent on systematic training. He proposes that music evolved as a by-product of other adaptations, without providing unique functional advantages. In the case of language, however, he posits a dedicated neural organ, innate grammatical components, and developing linguistic abilities that unfold naturally without any training (Pinker, 1999).

Although explicit knowledge of music and some kinds of performance may require training, intuitive knowledge of the structural and stylistic features of music results from mere exposure (Smith, Kemler-Nelson, Grohskopf, & Appleton, 1994; Tillmann, Bharucha, & Bigand, 2000). For example, adults typically detect sour notes in familiar musical passages (Drayna, Manichaikul, de Lange, Snieder, & Spector, 2001), and they do so even in unfamiliar passages that conform to the conventions of their musical culture (Cuddy, Cohen, & Mewhort, 1981; Trainor & Trehub, 1992). They recognize and produce a sizable repertoire of popular and traditional songs, and they can tap out musical rhythms (Snyder & Krumhansl, 2001). Moreover, mothers around the world sing to their infants in the course of providing care (Trehub & Trainor, 1998), and the songs they sing have striking cross-cultural similarities (Trehub, Unyk, & Trainor, 1993; Unyk, Trehub, Trainor, & Schellenberg, 1992). In short, musically untrained adults’ understanding of musical structure is comparable to that of musical experts (Bigand, 2003).

Proponents of modular accounts of language bolster their case by means of dissociations between various linguistic skills (Ullman et al., 1997) and between linguistic and general cognitive skills (Gopnik, 1997; Pinker, 1999). There are reasons to question the specificity of syndromes such as specific language impairment (Joanisse & Seidenberg, 1998; Norbury, Bishop, & Briscoe, 2002) and Williams

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