

# 音乐经验对汉语学龄前儿童语音范畴感知的影响：一项纵向研究

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范畴化是言语感知的一个显著特征，在早期语言发展过程中具有重要作用，反映语言加工渐进性、精细化过程。已有研究发现音乐学习对儿童言语感知具有积极促进作用。但是，音乐经验对频率和时长维度精细化语音加工是否具有影响，其有怎样的行为反应特点，目前还所知甚少。本研究旨在探讨音乐学习中不同训练项目和训练时长对汉语学龄前儿童普通话声调和嗓音起始时间(VOT)范畴化感知的影响。实验将 61 名 4 岁普通话儿童随机分为音高训练组(小钟琴组)、节奏训练组(非洲鼓组)和手工学习组(对照组)，在训练前、训练 6 个月和训练 12 个月时分别对被试进行旨在评估音乐能力、声调和 VOT 范畴感知能力以及认知能力的测试。研究采用重复测量方差分析评估不同任务中与训练相关的效果，并通过相关分析推断儿童音乐能力与语音范畴感知的关系。结果表明，小钟琴组在音乐音高加工和声调范畴感知方面优于非洲鼓组和对照组；非洲鼓组在音乐时长加工和 VOT 范畴感知方面均优于对照组。此外，音乐能力提升与语音范畴化感知程度增强呈显著正相关。研究结果为音乐学习促进学龄前儿童语音范畴感知提供了有力证据，强调音乐经验对儿童言语感知的迁移作用具有选择性，受训练项目和训练时长的影响。这一历时 12 个月的纵向追踪研究为音乐学习在教育和医疗康复领域的进一步应用奠定了良好基础，明确了长期持续的音乐训练，尤其是乐器演奏，将对学龄前儿童听觉发展和言语发展产生不可忽视的积极作用。

**关键字：**音乐经验，音高，节奏，言语范畴感知，学龄前儿童

## Effects of Musical Experience to Categorical Perception of Speech in Mandarin-speaking Preschoolers: A Longitudinal Study

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Categorical perception (CP) is one of the prominent features of speech perception and plays a crucial role in early language development, reflecting the gradual and refined process of speech perception. The previous data showed that musical training could enhance speech perception in children, yet it is still unknown whether musical training would have beneficial training effects on fine-grained speech perception in frequency and duration dimension. And we are unclear about the behavioral responses of such processing procedure. This study aimed to investigate the effects of different musical training programs and training duration on preschoolers' categorical perception (CP) of lexical tones and voice onset time (VOT) in Mandarin Chinese, which utilize pitch and time changes respectively to convey phonemic contrasts. Sixty-one Mandarin-speaking children aged 4 years were randomly assigned to

pitch-based music training (carillon group), rhythm-based music training (drum group), or handcraft learning (control group). Children completed tests designed to assess their musical abilities, CP of lexical tone and VOT, IQ and working memory at three time-points. Repeated-measures ANOVAs were conducted to evaluate the training-related effects in various tasks. A correlation analysis was used to infer the relationships between musical abilities and CP performance of speech. The results showed that the carillon group demonstrated advantages over the drum and control groups in music pitch processing and CP of lexical tones; besides, the drum group performed better in the music time processing and CP of VOT than the control group. Moreover, positive correlations were found between musical gains and improvements on CP of speech. These results provide evidence that transfer effects occur in CP of lexical tones and VOT in preschoolers. Our findings highlight the selectivity of musical advantages driven by different components of training programs and suggest that long-term musical training could be a means of early speech rehabilitation in children with communication disorders.

**Keywords:** musical experience, pitch, rhythm, categorical perception of speech, preschoolers