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## **Synchronizing and Maintaining Tempo: The Effects of Musical Training Among Older Adults**

*Haruka Kitamura*  
*Meiji Gakuin University, Japan*

*Hiromichi Mito*  
*Meiji Gakuin University, Japan*

### **Abstract**

#### **Theoretical Background**

In musical activities, two types of tempo skills are required: synchronizing and maintaining tempo. Studies on tempo skills have revealed that musical training and age are important factors that determine the level of these skills. However, it is still unclear whether the effects of musical training are maintained in old age. This study aimed to clarify the effect of musical training on synchronizing and maintaining tempo in old age.

#### **Method**

Twenty participants over the age of sixty participated in this study. Half of them are musicians who had received 7–31 years of training for their major musical instrument (piano—4, violin—3, cello—2, trombone). The other half were non-musicians who had 2–14 years of training in an instrument. The tempo tasks were synchronization and continuation. First, the participants listened to a sequence of 10 tones at a particular tempo and were asked to tap along with them (synchronization task). Next, they were instructed to reproduce the tempo they had just heard and continue tapping 10 times (continuation task). Ten different tempi were used (250, 350, 450, 550, 650, 800, 1000, 1400, 1800 and 2200ms), which were presented in random order. Each tempo was repeated three times.

#### **Results**

In the synchronization task, the accuracy of tempo synchronization was analyzed through two aspects: the consistency of the tapping interval and the gap between the tapping point of tone sequence and those tapped by the participants. In the continuation task, the accuracy of maintaining the tempo was analyzed through the consistency of the tapping interval and the difference between the tempo displayed in synchronization task and those tapped by the participants. In the synchronization task, musicians could synchronize more accurately than non-musicians at the tempi of 250ms, 1400ms, and 2200ms. In the continuation task, musicians could maintain the tempo displayed in the synchronization task more accurately than non-musicians at the tempo of 2200ms and 1800ms. However, there were no differences between musicians and non-musicians in the tempi ranging from 450ms to 1000ms in the synchronization task and from 550ms to 1400ms in the continuation task.

#### **Conclusion**

The results of this study indicate that musical training influence the skills of synchronizing and maintaining tempo even in older age. However, these skills are only evident for particular tempi such as fast and slow tempos.