



Brain Activation in Musicians and Non-Musicians

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ABSTRACT

Timbre is a characteristic of sound perception that aids in the identification of sound quality and source. When a sound is identical in other characteristics of its envelope, timbre is the defining feature that helps distinguish it. It is timbre that allows a listener to hear the difference in sound source when both a trombone and a trumpet play the same note simultaneously. There have been numerous studies associated with sound perception and pitch; however, there has been limited research on the specific influence that timbre has on brain activation in sound perception. In this presentation, we will be going over some of the current research that has been done on brain activation when it comes to music, and what future research needs to be done to understand the influence of timbre.

INTRODUCTION

6 BASIC PROPERTIES OF SOUND



PITT

- Wanted to look at the differences in how musicians and non-musicians perceive sound qualities
- Performed several different pitch and discrimination tasks
 - Two tones would play one after the other, and participants would determine whether there was no change, both change, pitch change, timbre change
- Results suggested that both groups were able to recognize changes in timbre as opposed to changes in pitch

SHAHIN ET AL

- Wanted to prove that different timbres evoke different responses in the brain
- Found that musicians had higher P2 and N1c amplitudes compared to non-musicians
 - Musicians may out-perform their non-musician counterparts
- Violinists showed greater P2 and N1c amplitudes than both the pianist and non-musician groups
 - We see a difference in the amplitudes of non-musician and musician groups, but also in the amplitudes of different kinds of musicians

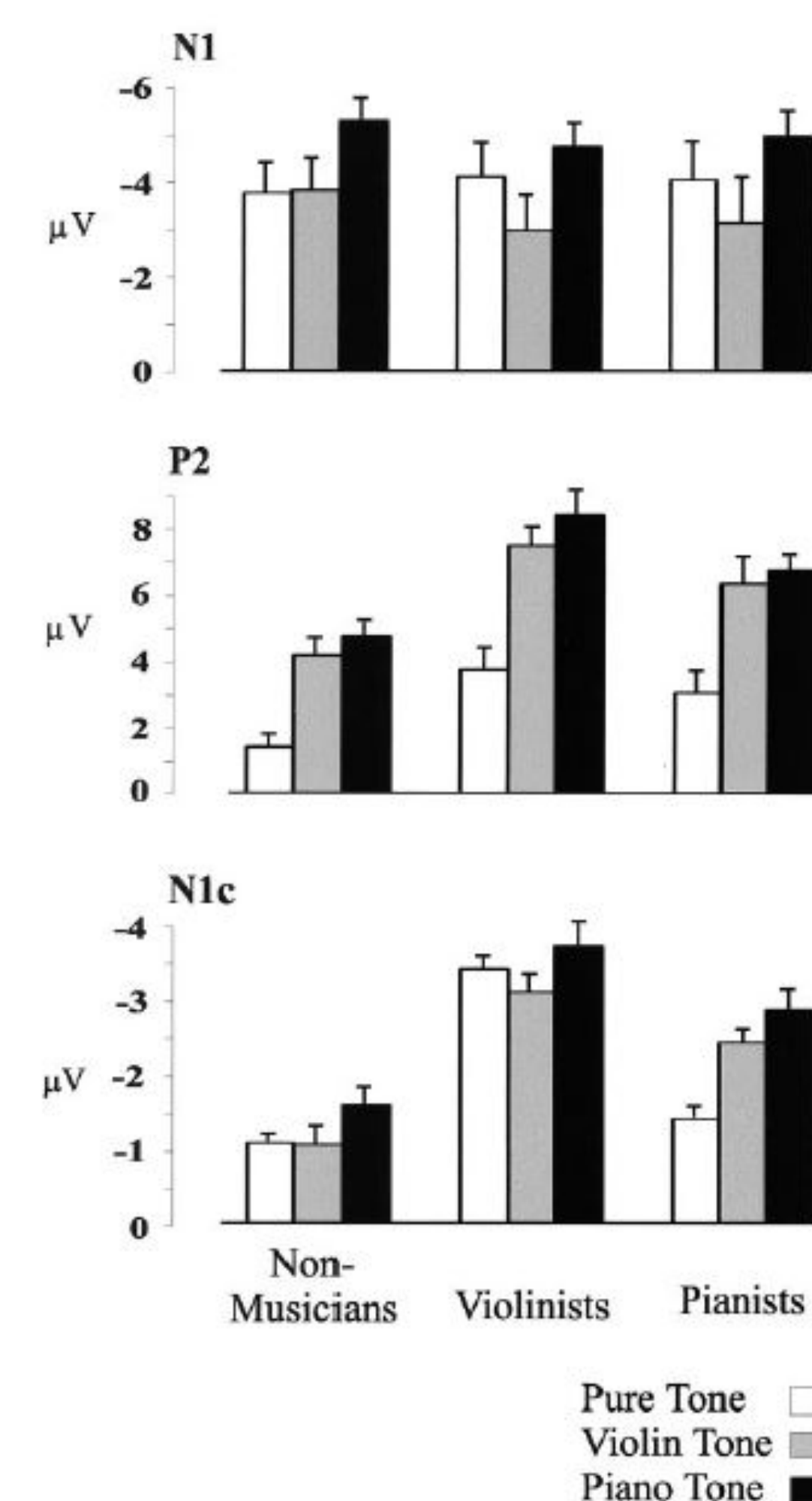


Figure 3. Amplitude of the N1 (top), P2 (middle), and N1c (bottom) responses is shown separately for each stimulus (pure tone, violin tone, and piano tone) in the nonmusician, violinist, and pianist groups. The bars depict 1 SE.

CHARTRAND AND BELIN

- Wanted to expand on Pitt's study, added in vocal timbres
 - 4 categories of instrumental timbres: piano, string, brass, guitar
 - 4 categories of vocal timbres: woman speaker, man speaker, girl speaker, boy speaker
- Results showed that the vocal discrimination task was the most difficult for both focus groups
 - Vocal musicians received the most accurate scores

WHAT'S NEXT?

- It isn't yet known if musicians are better than non-musicians at other voice processing tasks or other auditory stimuli, like environmental sounds
- We hope to see a study that looks further into the findings of Chartrand and Belin's study
 - Of the 17 musicians, only three were voice primaries
 - Since they scored most accurately, further studies into the sound processing methods of singers may be useful

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