

## Effects of Performing with Different Instrument Types on Violin and Viola Intonation

### Abstract

The present study was an attempt to measure the performance of intonation relative to different accompaniment timbres in a musical context. The purpose of this study was to examine violinists' and violists' intonation when performing as a solo and with cello, flute, and oboe accompaniment in a homophonic texture. The research questions were as follows: (1) Will intonation change from the first half to the second half of the excerpt? (2) Will violinists and violists perform intonation differently when performing unaccompanied and accompanied by cello, flute, and oboe?

Graduate and undergraduate music majors performed *Twinkle Twinkle Little Star* in Eb major on the violin ( $n = 14$ ) or the viola ( $n = 5$ ). They performed it in five conditions: without accompaniment and accompanied with a cello, flute, and oboe recording. Stimulus recordings were performed by graduate music students working on a terminal degree. Frequency data of participants and stimulus recordings were analyzed by Praat. Frequency data were converted to directional cent deviations relative to equal temperament. Directional differences between the original stimulus intonation performances (cello, flute, and oboe) in cent deviations and each participant's intonation performances was used for subsequent analysis. Participants' solo performance were compared to equal temperament.

Raw data for each condition were divided into two sets. *Twinkle Twinkle Little Star* had a total of 42 similar notes, the first 21 notes were considered the first set and the second set contained the final 21 notes. The string musicians performed flat relative to the accompaniment in the accompanied conditions in the first set, but not in the solo condition ( $M = 3.79$ ,  $SD = 7.27$ ). They performed sharp in all accompanied conditions in the second set. The string

musicians performed sharp when unaccompanied in both the first and second set. The string musicians also had a wider change between sets for oboe (+5.21 cents) and flute (+5.05 cents) compared to the cello accompaniment condition (+1.47 cents) and the no accompaniment condition (+0.42 cents). A within-subjects MANOVA found a significant multivariate main effect between the first and second sets. The first set was slightly flat and the second set was slightly sharp. Subsequent univariate tests were used to determine whether differences between sets and the accompaniment conditions were significant. No significant difference was found between sets for the solo and cello conditions. A significant difference was found between sets with the flute and oboe conditions.

The participants performed slightly flat relative to accompaniment in all accompanied conditions in the first half and performed sharp in all conditions for the second half. This change in deviation was consistent with previous literature that musicians tend to play sharp. The participants also performed with slightly less cent deviation when accompanied with cello than with flute and oboe accompaniments. This could be due to familiarity with the string timbre among string musicians.