The role of auditory and tactile modalities in violin quality evaluation

Indiana Wollman,[*#1] Claudia Fritz, [*2] Stephen McAdams [#3]

[*]*Lutherie-Acoustique-Musique, Institut Jean le Rond d'Alembert, UMR 7190, Université Pierre et Marie Curie-CNRS, France*
[#]*CIRMMT, Schulich School of Music, McGill University, Canada*
[1]wollman@lam.jussieu.fr, [2]fritz@lam.jussieu.fr, [3]smc@music.mcgill.ca

ABSTRACT

Background

Until recently, work on characterizing violin quality has mainly focused on physical properties of the instrument itself or on evaluation of radiated sound through listening tests. Saitis et al. (2011), however, have investigated violinists' evaluations while playing, bringing into consideration the sound and feel of the instrument. Many violinists consider that the aspect of “feel” is really important in violin preference, and it is not clear what is responsible for that: the ergonomics of the instrument, the response of the violin to the players’ input, the feeling of vibration through the left hand or the chin, etc.

Aims

This study explores the role of auditory and tactile modalities involved in violin playing and evaluation. It furthermore aims to construct a hierarchy of evaluation criteria that are perceptually relevant to violinists.

Method

Twenty professional violinists took part in a perceptual experiment employing a blind violin evaluation task under four different conditions. In the first condition participants were asked to order a set of violins by preference just by holding the instruments without bowing or plucking. In the other conditions, participants were asked to play and evaluate the violins either: i) under normal playing conditions, ii) with auditory masking or iii) with vibrotactile masking. Headphones fed with a noise signal masked the airborne sound produced by violins in the auditory masking condition. Vibrotactile masking was achieved by adding passive anti-vibration materials to the chin and shoulder rests as well as three vibrating rings worn on the left hand. The masking level for vibrotactile feedback was determined in a preliminary study. Under each playing condition, the evaluation itself was divided into two phases: i) assessing the intensity and the importance of eight perceptual descriptors of violin playing and sound characteristics, and ii) rating and ranking the overall quality of the violins.

Results

Results first confirm that violin preference is highly individual, which orients further analysis towards intra-subject analysis. These analyses reveal a consistent trend in violin rankings over the three playing conditions. Especially the most and least preferred violins are weakly dependent on sensory masking. More similarities are observed between the ratings under the normal playing and tactile masking conditions than for those under normal and auditory masking conditions.

Conclusions

The lack of auditory feedback has greater impact on violinists' perceptual evaluation. However, ratings based only on the tactile modality preserve overall rating trends, suggesting the existence of "tactile-only" cues.

Keywords

Violin quality evaluation, vibrotactile cues, auditory cues, cross-modality integration, violin performance

REFERENCES

Saitis, C., Giordano, B.L., Fritz, C. & Scavone, G. (2011). Investigating the origin of inter-individual differences in the preference for violins. *Proceedings of Forum Acusticum 2011, Aalborg. Madrid: European Acoustics Association.*