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A Comparative Study of Power Spectra and Vowels in Guarneri Violins and Operatic Singing JOSEPH NAGYVARY, Texas AM University

In contrast to other researchers of the violin, I have for long followed a subjective approach to characterize what could be viewed as standards of excellence in the tone quality of violins, played note for note by a world-class player. On this occasion I will present the most outstanding item in our data bank, the analysis of the Guarneri del Ges ex-Sauret, played by its owner Itzhak Perlman in a 2-octave chromatic scale. The second violin analyzed was the del Ges ex-Ole Bull. The tone quality of these violins is discussed in terms of their power spectra and similarities with those of the female singing voice. We have used a method of speech analysis, LPC with Praat, to determine the formants of vowels sung by a Metropolitan Opera soprano and those of the two violins. All the low notes of the voice and violins were then placed in a form of the IPA vowel diagram designed by Pfitzinger, whereby the vowels could be identified. Each violin has a characteristic distribution of vowels in the Pfitzinger plot, which can serve as identification and provide a basis for quality assessment. Some of the vowels are stable, others have a diphthong character. It is proposed that the famous masters of Cremona had a preference for a certain type of vowels in the various notes of the violin, and they could have used vowel identification as a means of quality assurance. It is a remarkable finding that the legendary "old Italian sound" comes with a strong French accent. We suggest that the user-friendly methods described here would be a useful supplement for makers and players in evaluating the quality of their own violins.