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## The Vibrato as Produced on String Instruments

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ing and their uses are also given. The comparison of preliminary and end tests shows gains in comprehension up to 60 percentiles while rate of reading has been doubled. Further, an analysis of the fortnightly delinquency reports shows only half as many receive delinquencies on the last report as on the first and only 40% as many delinquencies. It is to be concluded, then, that remedial training in reading is feasible at the college level.

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### THE HEARING OF THE VOCAL VIBRATO

HAROLD SEASHORE

Paralleling the extensive study of the artistic use of the vocal and instrumental vibrato is this study in the perception of the vocal vibrato. By using a synthetic tone-mixer, variations in pitch and intensity deviations, both as to rate and extent, were produced for the observers who responded by several methods — production, comparison and estimate. The data indicate that the observers, all of whom possess high musical discrimination for pitch and intensity, hear the deviations in pitch extent as about one-third the actual amount, that different rates of oscillation near the average of artistic usage, have little significant effect upon the perceived extent. The study is intensive rather than extensive. Some illusory effects are noted. The relation to musical *sonance* is discussed.

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### RELATIONSHIP OF CHANCE, OR CONSISTENCY, TO RATE AND EXTENT OF THE VIBRATO

MELVIN S. HATTWICK

The purpose of this study was to ascertain the role of chance, or consistency, in determining the rate and extent of the vibrato. Five most promising voice students of the University School of Music were secured for the study. Each was asked to sing two renditions of "The Last Rose of Summer" the second rendition following the first within an interval of five minutes. Recording of data in permanent form was secured by means of the strobophotographic camera, which simultaneously records duration and pitch changes,

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or variations of tones, in the form of a graph, with duration forming the abscissae and pitch the ordinate.

The length of each tone, the individual rates and extents of each vibrato cycle, average rates and extents of tones, relationship of rates and extents of vibrato cycles to the pitch of the tone were considered. Statistical treatment was employed to find the relationship of rate and rate, extent and extent, and rate and extent, thus showing to what degree chance, or consistency, determined the rate and extent of the vibrato. Analysis of extreme rates and extents was also made to ascertain the influence of pitch range in determining the rate and extent.

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## THE VIBRATO AS PRODUCED ON STRING INSTRUMENTS

SCOTT N. REGER

This study is concerned with the production of the vibrato on the violin, viola, and violincello. Comparisons are made with the voice vibrato throughout. The methods of producing the string vibrato physiologically and mechanically are considered.

Sources of material were phonograph record recordings by acknowledged artists on the instruments studied. Data in permanent form was secured by means of the strobophotographic camera, which simultaneously records the duration and pitch changes or variations of tones in the form of a graph, with duration forming the abscissae and pitch the ordinates.

The rate and extent of the vibrato cycle, the per cent of the total playing time used, the pitch curve or form of the cycle, and other peculiarities of each of the three instruments are considered. Individual variations, both by the same artist and among different artists are noted. The effect on the various aspects of the vibrato of the length of the note played, the pitch of the note, and the emotional type of music played — whether intellectual, agitated, or religious in character — are further treated.

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