

Effects on Vocal Range and Voice Quality of Singing Voice Training: The Classically Trained Female Voice

*Peter Pabon, †Rob Stallinga, ‡Maria Södersten, and §Sten Ternström, *Utrecht and †The Hague, The Netherlands, and ‡§Stockholm, Sweden

Summary: Objectives. A longitudinal study was performed on the acoustical effects of singing voice training under a given study program, using the voice range profile (VRP).

Study Design. Pretraining and posttraining recordings were made of students who participated in a 3-year bachelor singing study program. A questionnaire that included questions on optimal range, register use, classification, vocal health and hygiene, mixing technique, and training goals was used to rate and categorize self-assessed voice changes. Based on the responses, a subgroup of 10 classically trained female voices was selected, which was homogeneous enough for effects of training to be identified.

Methods. The VRP perimeter contour was analyzed for effects of voice training. Also, a mapping within the VRP of voice quality, as expressed by the crest factor, was used to indicate the register boundaries and to monitor the acoustical consequences of the newly learned vocal technique of “mixed voice.” VRPs were averaged across subjects. Findings were compared with the self-assessed vocal changes.

Results. Pre/post comparison of the average VRPs showed, in the midrange, (1) a decrease in the VRP area that was associated with the loud chest voice, (2) a reduction of the crest factor values, and (3) a reduction of maximum sound pressure level values. The students’ self-evaluations of the voice changes appeared in some cases to contradict the VRP findings.

Conclusions. VRPs of individual voices were seen to change over the course of a singing education. These changes were manifest also in the average group. High-resolution computerized recording, complemented with an acoustic register marker, allows a meaningful assessment of some effects of training, on an individual basis and for groups that comprise singers of a specific genre. It is argued that this kind of investigation is possible only within a focused training program, given by a faculty who has agreed on the goals.

Key Words: Voice range profile–Phonetogram–Voice training–Mixed voice.

INTRODUCTION

Background

This study set out to answer the question: Do years of voice training result in any modification of the voice range profile (VRP), that is, the maximum range of pitches and dynamics that a singer can produce on one and the same vowel? The process of conducting the ensuing longitudinal study generated numerous insights, which we will attempt to share in this article. The reader is assumed to be already familiar with the basic idea of the computer-based interactive VRP method of voice assessment.^{1,2}

Like a violin, the voice organ is a physical instrument, with certain inherent physical limitations. The violin cannot sound lower than its lowest open string. Its highest note depends somewhat on the skill of the player, but we might reasonably say that it is on the highest string at the end of the fingerboard. Similarly, a given person’s voice has a lower and an upper limit of fundamental frequency F_0 , although in a biomechanical ap-

paratus these limits are less consistent than those of the violin and may change over time. Training the voice reshapes the vocal instrument to some degree and improves the control of the instrument to a larger degree. The singer can also in some sense change instrument altogether, by changing to a different mode of phonation or register. When we acquire a VRP, it is not really possible to tell how close we are to the limits of the voice organ as such. The VRP is influenced by the protocol instructions, singer’s skill, and singer’s conception of what constitutes an acceptable production; and these are all factors that leave no trace in the acoustic signal. We will later return to the important issue of interpreting what the VRP actually shows.

To formulate a method to answer the research question initially posed, we first need a general idea of the typical extent and character of individual voice change, as it is reflected in the automatic recorded VRP. Figure 1 gives an example of four VRPs taken of the same student over the course of a training program.

A detailed commentary to Figure 1 is given in Appendix I (available online only). The example shows, crucially, that the VRP may report considerable intermediate changes during the singing study; yet when the posttraining results are compared with pretraining (Figure 1; I–IV), the end result is not necessarily very different from the initial one. This apparent lack of pre/post change clearly does not mean that nothing has happened. The VRP changes that actually result from training will depend on the training goal, desired singing technique (eg, classical vs jazz/pop), advancement in the study, and more. Therefore, any evaluation of VRP change becomes meaningful

Accepted for publication June 7, 2013.

From the *Institute of Sonology, Royal Conservatory, The Hague and Voice Quality Systems, Utrecht, The Netherlands; †Royal Conservatory, The Hague, The Netherlands; ‡Division of Logopedics, Department of Clinical Science, Intervention and Technology, Karolinska Institutet, Stockholm, Sweden; and the §Department of Speech, Music and Hearing, School of Computer Science and Communication, KTH Royal Institute of Technology, Stockholm, Sweden.

Address correspondence and reprint requests to Peter Pabon, Institute of Sonology, Royal Conservatory, Juliana van Stolberglaan 1, 2595 CA Den Haag, The Netherlands.

E-mail: pabon@koncon.nl

Journal of Voice, Vol. 28, No. 1, pp. 36-51

0892-1997/\$36.00

© 2014 The Voice Foundation

<http://dx.doi.org/10.1016/j.jvoice.2013.06.005>

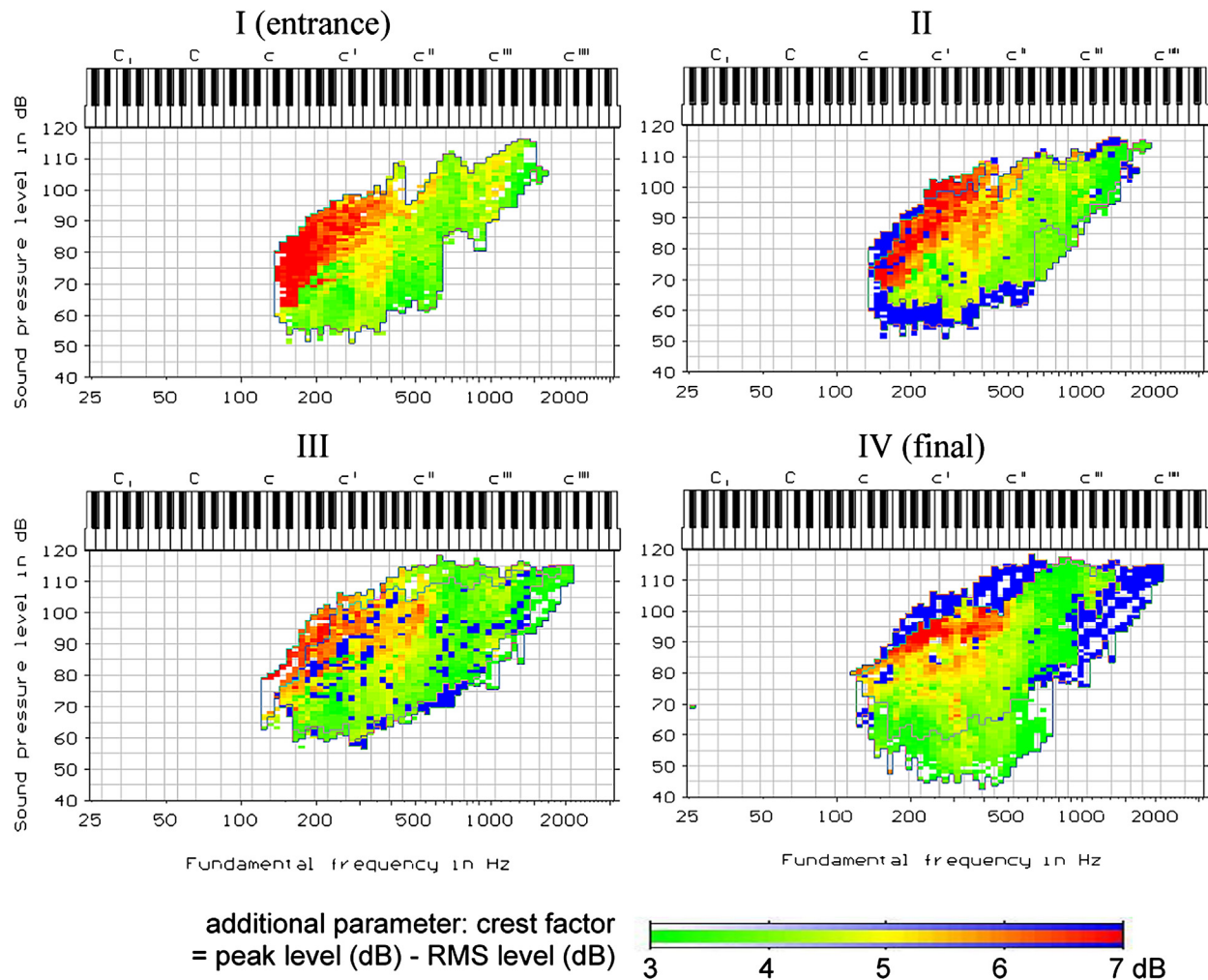


FIGURE 1. VRPs from the same singing student, made at different stages of the study program. (I) Entrance/first year, (II) second year, (III) third year, and (IV) fourth year/final. The blue color in the background marks the area that was covered in the previous recording. The red-yellow-green color gradient represents the values for the crest factor metric. An extreme red color typically marks chest/modal voice quality. The definition of this metric and the interpretation of the color patterns are discussed in the text. [Appendix I](#) (available online only) contains a detailed analysis and discussion of all voice changes seen in this figure.

only when it is related to the planned target and the current state of development.

The training model and the VRP

The VRP sequence in [Figure 1](#) was chosen as an example also because it is representative of many of the voices that participated in this study. The sequence portrays a fairly typical pattern of changes seen in female students of classical singing in the observed training program. The area around midvoice (center of the F_0 range in the VRP) stands out as a region of special interest.

On entrance to the program, each student is assigned to a teacher and may encounter other teachers later for training specialties. There is no formalized consensus on a training model among the teachers; however, from interviewing students during the recording process, a fairly general pattern of steps in the training could be discerned. In the program's model for training female classical genre/style, the praxis seems to be that first the highest notes get all attention (possibly resulting in

higher maximum sound pressure level [SPL] and F_0 values in the VRP). Then, the focus changes to the midrange and to equalizing the voice so as to bring the typical quality of the newly mastered high register range smoothly down to lower fundamental frequencies. In the final stage, the focus shifts to maintaining carefully the resulting core quality, while gradually improving control of the dynamic range. To interpret how this training regime might impact the VRP, we first need to consider the technique for register equalization.

Mixing

The equalization technique is called “mixing” (*voix mixte*).³⁻⁵ The singers tended to think of mixed voice as an intermediate register setting. A listing of students' descriptions of mixing is given in [Table 1](#). Mixing may be characterized as modifying the quality of the current register in anticipation of the quality of the coming register. The effect is to reduce the audible contrast between registers. For the female voice, this would imply that the specific quality of the high (falsetto/head) register is

Download English Version:

<https://daneshyari.com/en/article/1101987>

Download Persian Version:

<https://daneshyari.com/article/1101987>

[Daneshyari.com](https://daneshyari.com)