SAFEGUARDING VIOLIN VARNISH DURING REPAIR OF DAMAGES TO THE WOOD OF THE INSTRUMENT

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Abstract - A technique is discussed for the replacement of the badly deteriorated wood parts of a violin by Stradivarius with new material acoustically matched to the original using dendroacoustic analytical methods. Tests of the instrument on live audiences before and after treatment are described with the results expressed in decibels of applause over elapsed time. Some future projects concerning the removal and replacement of damaged materials, both metal and wood, are briefly outlined.

1 Introduction

The intention of this paper is to describe a hitherto unrecorded method of retaining the esthetic and acoustical qualities of a violin varnish while substantially restoring the badly decayed wood of the instrument itself. It has long been known that the essential quality of an excellent violin, and that which distinguishes it from another, is the varnish. The brothers Hill say with regard to Stradivari's varnish that "Fine varnish will not compensate for bad material or faulty construction; but that it makes or mars the perfectly formed instrument is, in our opinion, beyond dispute" (1). Clearly, the varnish with which the instrument is coated is the essential component in the formation of its tone. Not only does the varnish contribute in large measure to the acoustics of the instrument, then, it also has a distinct esthetic function. The way in which the varnish has aged - its craquelure pattern, the marks of wear with use on its surface, and even deposits of rosin and dirt on its surface - in short, its patina - constitutes a large part of its esthetic and historical integrity. It has been previously found impossible adequately to safeguard this vital functional component of the violin while still repairing extensive damages to the less important wood below. The following technique is seen by the author as a viable solution to this dilemma.

2 Method, 1st Stage

The belly, back and any other parts of the violin affected by woodworm, rot, *etc.*, are first removed from the instrument. With the varnished surface upwards the parts are then treated in the following way. Thin Japanese tissue is pasted to the surface of the varnish using Paranoid B72 in xylene as an adhesive. (Adenoid B72 is an alternative.) Once the entire surface has been faced, plaster of Paris is poured onto the facing to provide a firm base for the next stage of this treatment. The faced wood part is then turned upside-down and with a sharp gouge the rotted wood is carved away, down to the underside of the varnish/patina, thus leaving the vital component of the violin intact. A suitable piece of wood must now be selected for the purpose of reproducing the original support for the isolated varnish/patina unit. To this end the following technique, described more fully by Namreges (2), must be applied.

3 In Vivo Dendroacoustanalysis

This technique makes use of a cluster of matching transducers and cleverly sidesteps such problems of application as moisture content, orientation of sample, *etc.*, by a simple process of ignoring them. A small sample of the rotted wood must be tested acoustically with the transducer cluster and a preliminary response curve produced (Fig.1). It is considered *sine qua non* that the new wood be identical acoustically with the old. This often requires a certain *creativity* with the parameters. Once the vital acoustic statistics have been generated for the rotted wood it is necessary to carefully test a number of trees of the correct species until the best one for the purpose has been found. From the perfectly matching piece of wood so chosen

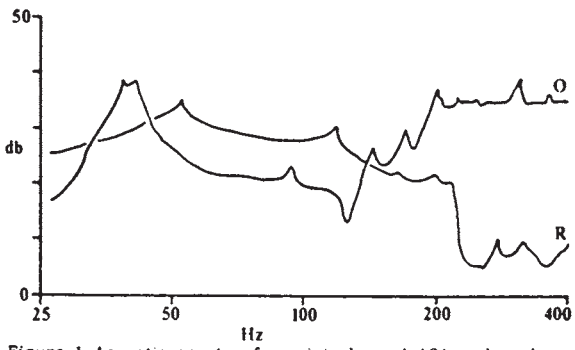

Figure 1 Acoustic spectra for original wood (O) and replacement wood (R) - intensity in db over frequency in Hz. These two curves would be identical if it was possible to allow for all the variables.

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the reproduction of the missing piece is carved. The acoustic curve of this piece is shown in Fig.1 compared to the original.

4 Method, 2nd Stage

In the case of the violin belly it is simply necessary to carve the wood as one would do when making a violin, periodically testing the piece against the varnish/patina for fit. Once the carving is close, the varnish/patina is lightly dusted with white chalk and this is used to "prove" the closeness of the fit. Once the wood has been carved to fit, and a thin even film of chalk is seen to be deposited on the wood, it is then necessary to attach the new wood support to the original material. Obviously the adhesive layer used must be very thin and even so that it has no effect on the acoustics of the final assembly. The author has found that a film of Paranoid B72 works quite well, although suggestions for an alternative will be gladly rejected. Because of the perfect fit between the wood and the varnish/patina one needs only to press the wood into place - the vacuum effect will do the rest. Once the adhesive has dried the object is turned over and the plaster support removed delicately with a suitable hammer. The facing is then removed with cotton swabs dampened in xylene and the transfer is complete.

5 Results

The violin treated by this method was tested on a live audience. An identical Vivaldi violin concerto (they are *all* identical) was played before and after treatment and the applause curves in db/elapsed time were compared (Fig.2). A noticeable increase in the esthetic and acoustic performance can easily be conjectured from these curves. Further tests on the violin repertoire with other instruments, including works by Walton, Saint-Saëns and Villa-Lobos, were equally successful, although at the close of the Elgar violin concerto the belly of one instrument under test collapsed under excessive neo-Romantic pressure (Fig.3).

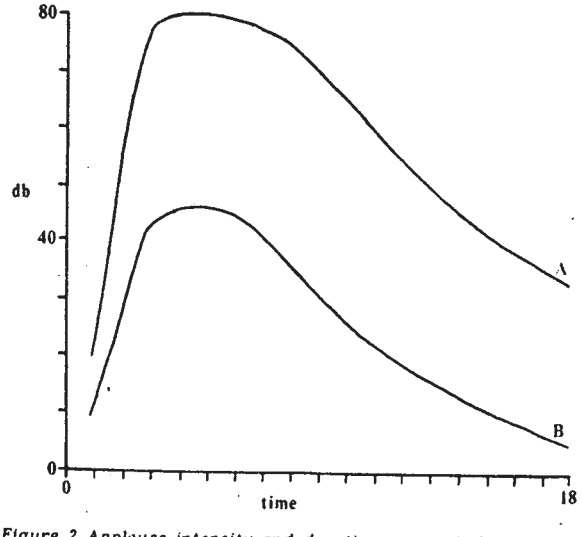

Figure 2 Applause intensity and duration curves before treatment (B) and after treatment (A). Applause is in db over elapsed time in seconds - Vivaldi standard.

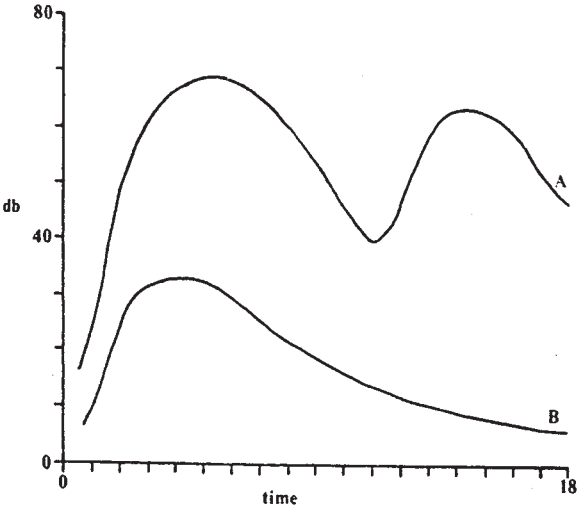

Figure 3 Applause intensity and duration curves before treatment (B) and after treatment (A). Applause is in db over elapsed time in seconds - Elgar standard. (The sudden increase in response at the eleven second mark of the after treatment curve was due to the poor taste of certain members of the audience who applauded the unfortunate collapse of the instrument under test.)

6 Conclusion

The technique described here has been applied *inter alia* to the restoration of a violin labelled "Antonius Stradivarius Cremonensis Faciebat Anno 1721" and thus obviously an original instrument from the great master. The results after treatment of this unique piece triumphantly validate the technique applied. Future projects include replacement of the soundboard in a French harpsichord while leaving the painted floral decorations intact, replacing the pipes of an 18th century chamber organ from underneath the gilding and, of particular delicacy, replacing a french horn inside the original and very attractive brown patina. No insuperable problems are anticipated with these future restoration projects.

7 Acknowledgements

The author would like to acknowledge the kind cooperation of the curatorial staff of the Franciolini Collection and in particular Dr. Aswan Streebgreeb for looking the other way on many occasions.

8 References

1) Hill, W.H. *Antonio Stradivari, His Life and Work*, p.179, Dover 1973.
2) Namreges, S. "Proposed Device for Acoustic Testing of Wood", in *Bulletin of the Fellowship of Bashers and Menders of Old Instruments (FoBMOI)*, 1978.

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Résumé - On discute d'une méthode pour remplacer les parties détériorées d'un violon Stradivarius par de nouveaux matériaux dont l'harmonisation fut établie en utilisant des méthodes analytiques dendroacoustiques. L'essai de l'instrument devant un auditoire avant et après le traitment est décrit, et les résultats sont exprimés en décibels d'applaudissment en rapport au temps écoulé. Des projets futurs de remplacement de pièces endommagées sont aussi présentés.

Auszug - Das Ersetzen von stark verfallenem Holz einer Stradivarius Geige wird besprochen. Durch Anwendung dendroakustisch analytischer Methoden wird das neue Material dem Original akustisch vollkommen angepasst. Test des Instruments an Zuhorern vor und nach der Behandlung werden beschrieben. Die Ergebnisse werden in Dezibels gemessen und richten sich nach der Länge des Applauses. Einige zukünftige Projekte, die sich mit der Entfernung und Ergänzung von beschädigtem Material aus Metall und Holz befassen, werden kurz hervorgehoben.