A CRITICAL REASSESSMENT OF THE 1686 DATING OF THE MESSIAH VIOLIN ATTRIBUTED TO ANTONIO STRADIVARI

Introduction

This exercise follows the publication of the article by H. Grissino Mayer et al.: Adverse Implications of Misdating in Dendrochronology. Addressing the Redating of the "Messiah" Violin, which we invite readers to refer to in the magazine Dendrocronologia (2010). Doi: 10.1016/j.dendro.2009.09.003. We do not intend to reply here to the unfounded negative judgment about our program and procedures, and the less than gratifying opinions as to our personnel's qualifications in the above publication, based on the authors' complete lack of knowledge of our methodology.

We would just like to point out that, if they had read our Manual (1) they would have realised that our whole procedure, which includes our program is based on the methods proposed by M.G.L Baillie (2) which, although they do not coincide with those of the Tucson school, are nevertheless a keystone for the use of dendrochronology in dating wooden objects, including musical instruments.

We are obviously disappointed at the arrogant and offensive way the authors refuse to recognise the validity of our 1832 dating of the treble side of the belly of the Messiah, against the Obersaxen master, which we obtained using our Segmentation analysis procedure (now a part of Synchro Search for use in realtime). But this has certainly not managed to silence us on the question, even though personal problems have forced us to delay the reply in this paper, which we think cannot but end all further discussion on the subject.

As part of reprocessing of the 'known' datings dealt with in these exercises, regarding the Messiah, we re-examined the method we adopted in our Manual (1) which consisted in cross-dating the floating chronology of the Messiah against the chronology of the Archinto viola, a choice of matching made by H. Grissino-Mayer.

As can be seen on page 159 of the Proceedings of the 29th Annual Convention Nov.8-11 2001 at Carlisle PA, J.V.S.A. Vol. XVIII. No. 2 (2003), Grissino-Mayer said, to summarise his own words, that he chose this matching because he had heard from J. Topham that the Archinto viola dated particularly well against the Messiah and, as a result of this matching, he confirmed that the year 1686 was the terminus post quem for the chronology of the belly of the instrument.
We chose the same matching, even though we had some doubts, as not long before Grissino-Mayer, again on page 159 of the *Proceedings*, adamantly rejected this dating procedure (instrument vs. instrument), saying: *I remind you that tree-ring sequences must date against master reference chronologies without doubt both graphically and statistically.*

On the basis of this assumption, which is the subject of Guideline IX, we verified the validity of the 1685 dating of the Archinto viola, another instrument attributed to Antonio Stradivari, which was used by Grissino-Mayer for comparison when dating the Messiah.

In the Appendix there is a matching between the Archinto and Kux-Castelbarco violas.

**MATERIALS AND METHODS**

**Hardware and software**
We used a PC loaded with the latest version of *Synchro Search*, which includes the Segmentation procedure and the database containing all the reference chronologies that are available to us, in *Synchro Search* format.

**The floating chronologies of the Messiah violin and the Archinto and Kux-Castelbarco violas.**
The chronologies of these instruments, all attributed to Antonio Stradivari and already dated, were created by Henri Grissino-Mayer and Paul Sheppard and are published in the ITRDB in Tucson format. We downloaded them and converted them into *Synchro Search* format using the Format changer routine, and then filed them and made them available as undated floating chronologies.

**The regional chronology created by Malcolm Cleaveland**
Malcolm Cleaveland created this chronology by working out the mean of the chronologies of three different species of trees: larch, Alpine pine and red spruce, growing on 16 sites, as described on pages 157-159 of the *Proceedings of the 29th Annual Convention Nov. 8-11 2001 at Carlisle PA, J.V.S.A Vol. XVIII. No. 2 (2003)*. We downloaded the chronologies in Tucson format from the ITRDB and, after converting them to *Synchro Search* format, we calculated their mean using an Excel worksheet. The mean was then filed.
RESULTS

Since on page 141 of the above mentioned Proceedings of the 29th Annual Convention of the Violin Society of America - Nov. 8-11 2001, Malcolm Cleaveland criticised the use of the PCAB Giertz Obergurgl master, saying that it was not suitable for matching between 1500 and 1700, and created a chronology made up of 16 chronologies of three species of trees, we repeated the matching between the sequence in raw format of the 159 rings of the total mean (trebles + basses) of the Archinto viola (black curve) against the segment of the Malcolm's chronology (red curve) that, according to Grissino-Mayer, confirmed its dating to be 1685, within the 1527-1685 limits.

Fig.1

![Graph showing Pearson's r = -0.3](image)

In Fig.1 the graph of this matching, shows the anisotropy of the tendency lines of the two series in raw format which have undergone logarithmic correction, while the red light shows that the covariance of the two sequences is negative, so the Pearson's $r$ correlation index is also negative: $-0.3$.

It would be therefore absolutely unacceptable, according to the Baillie's theory (2) to cross-date the two series in indexed format obtained either with a running mean or in “residual” format.

By initially cross-dating the two series in an indexed format (a procedure that we advise against in Guideline II), Grissino-Mayer could not have realised that they could not be correlated, so the dating 1527-1685 for the Archinto viola, that he obtained, is meaningless, since “That year-to year detail does match it is not necessarily true for trend matching” (Baillie).
CONCLUSIONS

As demonstrated in the graph in Fig. 1, the dating 1527-1685 for the Archinto viola, proposed by Henry Grissino-Mayer, is meaningless, because, according to the postulate sustained both by Baillie (2) and also by Grissino-Mayer (5), in dendrochronology, matchings cannot be accepted between negatively correlated ring series.

On page 82 of his book *Tree-Ring Dating and Archaeology* (2) Baillie writes:

*If the values of x increase and decrease when the values of y increase and decrease, then the correlation is positive. This is the expected condition for the ring widths of two trees growing over the same period of years. Thus the basic assumptions of the dendrochronological method argue for the use of a direct parametric correlation method... Increasing x associated with decreasing y would show negative correlation.*

Since the chronology of this instrument was used by Grissino-Mayer as the reference chronology for cross-dating the Messiah within the meaningless 1527-1685 limit, it is legitimate to deduce that the 1686 dating of the Messiah is also meaningless.

So the doubts that we allude to in the Introduction, as to our decision to follow Grissino-Mayer's procedure were not unfounded, considering the results of this exercise, where we demonstrate that when proceeding in this way the 1686 dating for the Messiah is incorrect, in the same way as that of the Archinto viola was incorrect.

This is because, for the dating of this viola, the American dendroclimatologists did not pay sufficient attention to the logical and reasoned rules of dendrodating proposed by Baillie (2), Baillie and Picher (3) and Munro (4), according to which the 1685 dating of the Archinto viola should be considered a mismatch, and therefore insignificant.

On page 82 of his book *Tree-Ring Dating and Archaeology* (2), which we quote in Guideline 2 Baillie writes:

"When mismatched, the correlation of these sets approximates that between two sets of random numbers" and the same concept was still underlined by Baillie and Pilcher in their article (3).

An explanation of the "mismatching", which we also quote in Guideline III, can be found in the article by Martin Munro (4):

..it is important to bear in mind that filters constructed for other purposes (such as dendroclimatology) will not necessarily be the best ones to use for crossdating problem
Note

We would advise those who are particularly interested in this subject, to carefully read and study our new Guidelines and, above all, to refer to the book by M. G.L. Baillie, *Tree-Ring Dating and Archaeology* (1) - pages 79-92 in particular, as well as the articles by M.G.L Baillie & J.R. Pilcher (3) and by Munro (4), all belonging to the school of dendrochronology as applied to dating wooden items, and not to climatology, at Queen's University of Belfast.
On page 159 of the *Proceedings of the 29th Annual Convention Nov 8-11 2001 at Carlisle PA, J.V.S.A Vol. XVIII. No. 2 (2003)*, Grissino-Mayer says that he obtained an excellent cross-dating in the period 1559 – 1683 for the Kux-Castelbarco viola, against the chronology of the Archinto viola, which he also used to date the Messiah. He emphasized that its Student's $t$ value is equal to 7 and that this cross-dating is perhaps the best they had obtained for all the instruments they had examined until then.

As the 1527-1585 dating for the Archinto viola, which we have demonstrated is incorrect and meaningless, the 1559-1683 dating of the Kux-Castelbarco viola, obtained by matching it with the Archinto viola in the same period, is also meaningless, in spite of the high Student's $t$ value of the cross-dating. On this point we must bear in mind the words of Baillie: “A genuine match will normally yield at least $t = 3.5$, but just because a match has a value of $t > 3.5$ does not mean that it has to be correct”. (1)

We decided, therefore, to verify the degree of similarity between the two violas; to this purpose, using *Synchro Search Format Changer* routine, we converted the 159 rings of the floating chronology of the Archinto viola chronology into a master chronology.

As required by the program (see Book 3 Tutorial) we should have had to give the master chronology very precise time-limits which usually are corresponding to calendar years. But we did not assign to the master calendar years as time-limits and adopted a digital range from 1 to 158, corresponding to the number of years covered by 159 rings.

Fig. 2 shows the cross-dating of the 125-ring sequence of the total mean of the Kux-Castelbarco viola, against the ring sequence of the total mean of the Archinto viola in the range 1 – 158, in raw format. Note the isotropism of the tendency curves.

As can be seen from the top ten list at the upper left side of the graph, the limits for the most satisfactory cross-dating of the Kux-Castelbarco viola are 33 – 157.
Statistic of the matching: Gleichlaufigkeit 72% Pearson's r 0.89 Student's t 21.73 Matching 72%, length of segments 40 rings (39 years) overlapped at 20. Six segments on six overcome the benchmark value = 0.36.

Fig. 3 shows the summary of the Advanced statistic related to the matching of the 125 rigs of the Kux-Castelbarco viola against the 158 rings of the Archinto, that we requested by clicking on Other Inf on the Match Screening graph.
Fig. 4 shows the same cross-dating as in Fig. 2, with the series in indexed format obtained with a running mean of 7 in 4 (7% filter) which has cancelled the effect of the autocorrelation, and where the Student's $t$ result, equal to 7, as that obtained by Grissino-Mayer, is confirmed for the cross-dating of the Kux-Castelbarco viola against the Archinto master, which we suppose he carried out with the two series in "residual" format.

Statistics for the matching: **Gleichlaufigkeit 72%**, Pearson's $r$ 0.59 **Student's $t$ 7.93** Matching 72%, Length of segments 40 rings (39 years) overlapped at 20. Four segments on five overcome the benchmark value $= 0.36$.

It should be remembered that, if the Logarithmic correction is applied, the Student's $t$ value increases to 8.14, whilst the values of the other parameters remain the same.

**Obviously, when carrying out this cross-dating either by replacing the 33-157 raw limits with the (incorrect) 1559-1683 limit, as did Grissino-Mayer or with any other limits we can give to the Archinto viola master, as long they add up to 124 years, the same statistical results are always obtained.**

The reader should refer to the Chapter on Reasoned Statistics in Book 2.

**Concluding**, these results and the identity of the values of the autocorrelation coefficient of the wood of the two violas, as we can see in the summary of the Advanced statistic in Fig. 3, would confirm that the two instruments were built with wood from same matrix tree.
But, as known, since the two violas went through the workshop of the Parisian luthier Vuillaume, it cannot be excluded that the two instruments, we are studying, originated from that workshop, as wonderful forgeries built by him, as was the Messiah of Oxford.

REFERENCES


3. BAILLIE M.G.L. and PILCHER J.R., A Simple Crossdating Program for Tree-Ring Research, Tree-Ring Baillie e Pilcher (Articolo CROS)
