

# Can You Reproduce an Instrument?

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Briefly, the answer is No. Or anyway, Not exactly.

There are several reasons for this. One is that the original is old and that its dimensions have been distorted by time and perhaps also by past usage (wear and tear, as one might say). The bore, the internal dimensions, which are the ones that really matter to the sound, will almost certainly have gone oval rather than circular due to the natural movement of the wood undergoing climatic stresses over the years.

Then players will have been at it, altering the tuning subtly by undercutting fingerholes and other such minor, but important, alterations.

Most importantly is that wood is a living substance; it moves all the time with variations of humidity and temperature, so that a measurement taken today will differ, if only slightly, from one taken yesterday, last week, or last year.

You can measure metal, which is comparatively inert and will only move by microns within any normal ambient temperature, to a thousandth of an inch – engineers habitually talk of ‘a thou’ or nowadays of even finer units, but you can’t do that with wood. If you can work to half a millimetre you’re very lucky indeed.

And if you are measuring a metal instrument, you’ll be lucky if you can do any more than measure the outside; since almost all are bent, curved, or coiled, you’re unlikely to be able to get any precise indication of the dimensions of the inside, and the odd blob of solder or any other variation in the inside of the bore will make a great deal of difference to the behaviour of the air column. All brass players know that the presence of even a slight dent in the tubing can make all the difference to the tuning of one or more notes. All brass players, too, know that different metals make different sounds. There’s no point in making a copy

of a yellow brass instrument in gold brass and expecting it to make the same sound, nor in silver-plating it. We all know how much difference lacquering an instrument makes.

And even more seriously, returning to wood, wood is a natural material, growing in a tree. Where it grew, what the climate was while it was still growing, the chemicals in the ground and in the air, whether it was north-facing or south-facing, etc., all make a difference. And then, once cut down, it'll depend on how it was seasoned and for how long. How can you ever get another piece of identical wood? Even if you could go back to the forest it came from, you'd never find a tree growing today in the same conditions that the original tree grew in a few hundred years ago. And that's if you can even get the same species of tree! You won't be able to get pernambuco today if you're a bow-maker; you won't be able to get any of the dalbergias, rosewood, African black, and many others if you're a woodwind maker; they're all on the CITES lists. And you won't find boxwood in the dimensions that Stanesby got. There's a lot of good fruitwoods around (too many orchards have been ploughed up) and they'll turn well but they won't sound the same as box.

If you're looking at reed instruments, you can't even get the same sort of cane to make the reeds. It's cut younger today, seasoned more briefly, and anyway, as with wood, the atmosphere has changed so that the constituency of the cane has changed. So even when you've finished your oboe, clarinet, bagpipe, or bassoon, the characteristics of the reed that initiates the sound will be different from that of any earlier reed.

When I was at the Bate Collection we published a great many measured drawings of our instruments so as to give instrument makers the best opportunity to try to make reproductions. Arnold Myers did the same at the Edinburgh collection (EUCHMI), and so did others. Quite a few of the people who'd bought Bate plans brought their instruments back to compare them with the originals. Not one, not a single one, sounded the same as the original when they were played side by side.

There's a number of reasons for this. One of course is age, even allowing for the fact that any new instruments needs playing in to reach its real sound

quality and response. Another of course is shape; if the original bore had gone oval (and almost all had), some guesswork, not just averages between maximum and minimum diameters, is involved in compensating for this. Length is also a variable, though that's usually slight, more influential is shrinkage of tenons and sockets, which can lead to slight variations in the bore. But also there is micro-measurements. Yes, one can measure wood to some extent but few drawings are absolutely exact (3D machines are making a difference here nowadays, and I'm speaking of times before 1995 when I retired). But when we looked very closely at a Bressan treble recorder copy that had come very close in sound, we could see just a hair difference here and another there – it was not possible to make so exact a copy to avoid such micro-variables (and bear in mind, too, all the caveats about measuring wood above).

And then comes the most serious problems. Yes, that Bressan copy was at the same pitch as the original, around A at 409Hz. Now how much use is that? Who is playing at A 409? Ok for a recorder maybe, which is just going to play with strings who can tune to it. But no use for an oboe, flute, or clarinet that's going to play in an orchestra, the Galpin oboe for example which does look like Bressan's work (it has no mark) and which is probably at that same pitch, though this can depend on the reed. So, many reproductions get extended or shortened to match some of the common pitch standards used today, and here calculations plus some guesswork are involved, and the result is also slight tonal changes. So your reproduction is not an exact copy, it's a variant of the original and it's never going to sound the same as the original.

So far I've only discussed woodwind, with a slight reference to brass. With the brass, we can seldom see inside the tubing, not even trumpets and trombones with their long straight sections. All that makers can do, and some of them produce very good instruments, is to reproduce, as nearly as possible, what Haas, Raoux, and others did in their workshops, and as I've found, no original Raoux horns that I've blown, have responded in exactly the same way as each other, so the best modern examples have also varied in similar ways, but close enough to count as variable reproductions. Instruments like that, using such dimensions as are available, using as nearly as we can analyse them the same sorts of metals, and working in the ways that those makers worked, those we

could call generics; they are generically the same sorts of instruments as those made by those early makers.

Bowed and plucked strings are impossible to copy. You can measure a Strad till you're blue in the face, but you can never get the spruce and the maple woods that he used, so there's no point in making the little variation in thickness here and the other slight variation there because he did that to adjust that piece of wood and you haven't got the same piece of wood that he had. All you can do is make the best fiddle that you can. Same with guitars and lutes, and they have even more problems because of the bars under the soundboards – they are there for a reason to adjust that soundboard, and so are their lengths, positions, and thicknesses, and you've not got that same soundboard that he had. Besides, you can't get the same strings today as they had then, and I've never yet seen a reproduction or 'put-back' fiddle with the same shape of bridge as those we see in the Vanitas and other paintings. All these things make a difference (and don't start on varnishes). Again, what you can do is make generics and if you're as good a maker as Strad was, maybe you'll make as good a fiddle as he did.

Keyboards are even worse off. Very few of the materials involved are available today. Very few are in original condition, anyway, so we can't make a drawing of it as it was originally, only as it is today. And if they were in original condition, it's not often that you can get inside the thing to see exactly what goes on under the soundboard and between it and the bottom boards. Again, all you can do is work the same way as the original makers did and hope for the best. But nobody does today.

Most customers today expect really well finished instruments. Did the customers then? The evidence does not seem to support that. Did Blanchet or Stein have a ten-year waiting list? It looks as though they slung the instruments together as fast as they could, not quite like Fords on the production line in Detroit but not far off. They were not making Rolls Royces, or not often, but they were making harpsichords and pianos for the general customers, and many originals look like it. Tielke in Hamburg was making mostly Rolls Royces, but many of his colleagues down the road were batting out their lutes and citterns quick and easy. Same with 'ud makers in Morocco, they are churning out their lutes

as fast as they can, and they always have, because they only eat when they sell one.

And this applies to the woodwinds as well. We can be sure that most of them made instruments in batches, a row of head joints, reset the lathe, and then a row of upper bodies and so on. That's why a Monzani flute of mine has keys with three different date letters on them (Monzani usually put his keys through the Assay Office so that they have hallmarks on them); he simply put his hand into each box of keys and pulled out the first F key or C key that came up. Of course there were exceptions; Richters produced some Rolls Royce quality with beautiful rose-engine lathe work in ivory, but he also produced some Fords – we have one of each in the Bate. There are always upper-class customers for all instruments, but there are also professional musicians and ordinary amateurs who just want a good working instrument.

Some of our modern makers need to bear this in mind and put themselves, in their imagination, into the workshops of the original makers. Then, if they've compared a number of instruments or drawings from the same maker that they're trying to copy, instead of trying to produce impossible one-off reproductions, they can produce the generic Stanesbys, Monzani's or Denner's like those that those makers produced, and with luck and if they're as good craftsmen as the original makers were, their instruments will sound near enough, but never exactly like the originals may have sounded when they were new.

Post Script: Never, ever, put an original maker's name on your instrument. It's against the law and you can go to jail. I once saw a 'reproduction keyboard' exhibition and there were pianos with a Walters nameplate on them. I tried to explain to the maker what could happen to those in a hundred years, but he seemed not to understand. So I told him that these were forgeries and that producing forgeries was a criminal offence. It's a criminal offence even if the label (like a fiddle of mine) says *Antonio Stradivarius fecit; made in Czechoslovakia*.