Volume 2, Chapter 12: Eliminating Defects and Knowing the Reasons Behind Defects

The two sound retainers, the dragon pond and phoenix pool, the area within the belly of the ch'in, etc., are places where sound is retained. The various defects of emptiness, scattering, noisiness and muddiness all arise from this area and have certain differences. Some occur because the area within has been carved out to an excessive degree, so that the cavity is too empty. This causes the sound to be empty and noisy. *[It resembles a flood and is not clear. If it is clear, then it is not so noisy with a booming sound.]* Some defects like this arise because the surface is too thin. *[If one carves out too much, then it may be thin. If it is already too thin, it is difficult to add any thickness. This cannot be repaired. The only possibility for fixing it is if it is too thick, then one can carve it out and make it thinner.]* If the face board is not too thin, and there are these kinds of defects, take the face board, *[this refers to the seam it makes with the bottom]* and all around the edge get rid of 1-2/10's or 5/100's of an inch. Try it out. This should make the sound condense, *[so it is not scattered]* full, *[not noisy]* and quiet, *[so it is not muddy]*. It can be done this way.

Or take the bottom border, *[where it meets the top board]* and remove 5/100's of an inch. Put it together with the top board. This is because it may be unsatisfactory to take too much off the face board, so take some off the bottom. Then put the boards together and the cavity may not be too empty.

Some defects arise due to the fact that the sound retainers are not put on, so there is nothing to hold the sound in, and it floats off. This should be remedied by sticking on a convex shaped piece of wood, using glue-lacquer and bamboo nails to fasten it. *[Boil down some thick cow glue and mix it with lacquer. Use this and bamboo nails to fasten it on secure. Expose it to some humidity so it will set]*.[1] So then the sound will not leak straight out.

Some defects arise because this convex form may be too tall, causing the pool and pond mouths to be blocked up, thus resulting in deadening of the sound. *[Mute and not bright.]* Some defects arise because the cavity is carved out too near the bridge to the point where less than an inch of solid wood may be left. *[Actually 8-9/10's of an inch is also all right.]* Sometimes even the whole amount of wood is carved out under the bridge causing the strings on the bridge to not have a solid connection. Thus the defect of empty sound arises. One must fill in some solid wood here and use the glue-lacquer mixture mentioned before to make it secure. It is best if it is the same as the original wood that was there. *[The essential point is that the work of repair must be done well, so that there is no difference between this and the way it should have been done*

[1] Humidity hastens the drying of lacquer.

originally.] Some defects arise because over an inch or even two inches of wood is left, causing the sound to be deadened. One should gradually carve it out, thus freeing the sound. The wood left around the nut should be the same. All this is because these two places are where the strings touch and sound. If there is too much wood, then the sound is made mute. If it is too empty there, then the sound is dissipated. One must do this correctly as it is very important. If the two pillars are low and do not touch the top or reach the bottom, or they have not been put in, then the top and bottom will not be connected by anything, and the defect of a bent waist may arise. If the two pillars are too tall, the bottom and top will be difficult to fit together. They should be as tall as the space in the belly cavity.

All of these defects can be repaired. Where reductions or additions should be made, it is essential to first carefully consider and then gradually experiment, not allowing any place to be too big or too small. Thus one can approach perfection. So the sound, which should be light, clear, full, profound, euphonic, and extremely beautiful, comes out of the wood having all the requisite four qualities of beauty; that is, light, relaxed, crisp, and smooth. This (perfection) also depends on mastery of the craftsmanship involved. Some problems arise because of humidity and because dirt gets in the ch'in causing the sound to be deadened. Here the method of steaming in a kettle is used. Sometimes problems also arise because the lacquer-powder mixture peels off, the seam splits open (on the side), the bridge, nut, or hui lose their precision, or the strings, fasteners, pegs, and feet get broken: all of which can cause the defects of: unclearness and decrease in the sound, imprecision, resistance in the fingering, etc.

If one repairs according to the method and thus brings out the fundamental basic nature (of the materials), one can then be certain of success. If the workmanship is ordinary or poor, or the repairing is done recklessly, then the situation will be worsened. So then as for the methods of repair, one must make a thorough investigation of what is best. If one has ordinary materials and repairs according to what is correct and exerts his skills, one will (at the most) merely uncover the original nature of the material and that is all. If the material originally was good and if the ch'in was made when it was new, then the ch'in will contain excellent sound, stored up and not yet released. After a long period of time, the original natural will be completely transformed, and the sound will come out. This is not something that can be achieved by the efforts of men.

The method of steaming in a kettle: Make a wooden kettle with the diameter a foot wide. It should be five feet tall. The base should be set off the floor by a foot. In the bottom board (of the kettle) cut some holes in order to permit steam to enter. Now pour some water into a boiler and put the kettle in the boiler. Put the ch'in in the kettle and use a gentle flame, steaming it for five to six hours. Afterwards take it out and dry it in the wind. Thus the mold and dirt will be cleaned out. It is necessary beforehand to take the ch'in and open it into its two halves, and then put them in a stream for ten days. It is best to steam it after it has been washed clean.

The striking noise and striking finger defects on the face of the ch'in: When one mentions "striking noises", what is referred to is the sound being deadened and producing a rattling noise. For the most part these are caused because the face is not flat. If the face has any depressions or non-flat places, they can easily be seen. If the differences in height are slight and the surface is not extremely flat, then the problem may be beyond the distinguishing powers of the eye. However striking noises can still arise. So one must take a long rock *[A foot or so, the longer the better.]* with a flat face, *[dip it in water.]* and lightly rub the surface of the ch'in with it. In this manner one then can get rid of the defects. On the face of the ch'in, from above the first hui to the bridge, if it is uniformly flat and only gradually gets a little lower, then the right hand fingers will strike the face of the ch'in. This should be repaired according to the method.[2]

The striking noises and dead sound defects of ch'in strings: Ch'in strings can have two kinds of defects. The first defect is that the outside wrapping of strings one to four may be loose. So then the inner and outer parts become separated, deadening the sound. One should take glue, alum, water (and mix them). *[Take a tenth of an ounce each of fish glue, cattle glue, and alum, mix with water and when this comes to a boil, add five hundredth's of an ounce of raw white alum. This should not be too thick. However it should be paste-like.]* Or take fresh mulberry leaves and pound them into juice. Paint the strings all over. Allow to air dry. The sound will be bright.

The second defect occurs because the string after having been broken, is stuck back together, leaving a scar like a knot. *[Like a fine grain of rice between the fingers.]* This strikes the face of the ch'in and causes striking noises. Take a small knife with a thin edge and placing it on the string, lightly pare off the knot. Thus the sound will be made clear.

Defects of the bridge; that is, striking noises, striking fingers, shifts in position, and fleeting sounds: The bridge should not be tall. For details on the methods involved, see the section "Fitting the Bridge and the Nut".[3] If it is too low, the fingers will cause the string to be too close to the surface and striking noises will result. So then the bridge will be useless. One must make another and exchange it. If too tall, or not made according to the form of the face of the ch'in, *[the form should be like that of the face around the area of the fourth hui.]* then the fingers will meet resistance. *[This means that too much energy has to be used in order to press down the strings, so that one may be unable to press them down to the surface.]* One should gradually sand (or rasp) the bridge down, checking the results at times. One should also make it like the form of the face. If the bridge is crooked or oblique, then the positions for the harmonics will be shifted. It should be made straight. If there is a gap, *[the bottom of the bridge is not touching the top board]* then the sound will be fleeting. This must be repaired. Make it tight.

The defects of the nut and yin-t'o; **that is, striking noises, shadow sounds, striking fingers, and broken strings:** The nut should be extremely low. If it is too low in relation to the face, then striking noises will result. If the nut is still too close, *[that is, not too low or too tall]* then shadow sounds may result. *[Like a shadow following the form. It seems like it is real, but it is not. The sound is unclear.]* One must make it slightly taller, or install a feather bone. If the nut is too tall, then fingering will be difficult. If on the outside of the mouth of the nut, there are any jagged places, then the

[2] That is, plane off some wood so that the face descends to the bridge.
[3] Volume 2, Chapter 7.

strings may be harmed and are easily broken. This is also true for the yin-t'o. Both must be made smooth.

Defects of the hui; that is, shifting of harmonics, being hidden, obscured, scattered, and vulgar: The hui should be in the proper positions. If they are out of position, use the eight-square, five-fold method to fix them.[4] If they are too big, then they are vulgar. If too small, they are obscured. If they are not all in a line, *[away from the side of the first string]* then they are scattered. If they are hidden, *[concealed under the first string]* then they are concealed. In all cases one should consider what is correct, and then repair accordingly.

Defects of the pegs and (wild geese) feet; that is, blocking the fingers, looseness, slipping, shakiness, etc.: There are seven pegs. They should each be about $1/10^{th}$ of an inch apart. If they are too close, then when one desires to turn them, the fingers will be blocked. If too big, then they will be crowded together and the same defect will arise. The top of the pegs should be like a nest. If it is flat, then they may slip. The feet should be flat. If they are crooked, then when the ch'in is laid horizontal, it will wobble. They should also be rough (on the sides), because if they are smooth, then the strings may slip off. Everything should be fixed accordingly.

Defects of the yarn fasteners and string heads[5]; that is, hard to turn, easily broken, no sound, hard sound, vulgar, insubstantial sound, etc.: The yarn fasteners should not be too tight or too loose. If too tight, then tuning the strings will be difficult. If too loose, then the fasteners will be easily broken. If they pass over and beyond the bridge[6], then the sound will be hard or metallic. The heads of the strings should be small. If too big, then they are vulgar. If disorderly or reversed, then the sound will be insubstantial. Eliminate all the defects and fix things up according to the method.

Defects of the peg pool and string holes; that is, cracked, oblique, too much separation, slippage, crowding, blocked, hard to turn, etc: The peg pool back should also be flat and rough. If it is convex or concave then the pegs will be crooked. If it is smooth, then the pegs will slip. The string eyes should be perfectly straight. If they are crooked, then the fasteners will not be close to the bridge. If too close together, then the pegs will be crowded together. If small, then the fasteners will get stuck and be hard to move. Everything should be repaired correctly.

The humpbacked and bent waist defects of the face: Sometimes because when a ch'in was made, newly cut materials were used in which the resin was not removed or had not yet dried out after the passage of years, the wood while slowly drying, may hump or

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[4] See Volume 2, Chapter 9.
[5] Bowtie-like knots on the bridge end of the strings. They are called "fly heads" in Chinese.
[6] On the string side of the bridge.

bend. *[If the bottom bends, this is humping. If the top bends, this is bending.]* Sometimes it humps and bends because of the invasion of moisture, or because it get too dry in sun or wind. Sometimes humping and bending arises because something heavy is put on the ch'in. Take the ch'in and open it up, and put both halves in water. After it has soaked, take the bottom and top and use two perfectly straight boards to press them together. *[The boards should be solid, straight, and 2-3 inches thick. In no case use warped boards, or use a flat stone]* Put it all on a table or flat place and gradually add on some heavy rocks, until it becomes flat. Now either put it out in the sun to dry, or use a fire and bake it for several days. Now take off the boards and everything should be right. This method works best when one first soaks the ch'in wood through, thus making it possible to change its nature. Then afterwards apply pressure, thus causing it to gradually return to straightness. Then it is necessary to dry it by sun or fire, taking off the boards and heavy pressing materials. Fix its nature and thus there should be no more instability.

The method for repairing tuan-wen (斷文) (lit., "burst patterns"):[7]: The ch'in has tuan-wen because after the passage of many years, the nature of the powder-lacquer mixture changes. Because of this a ch'in will come to have blisters, which may easily flake off. Cavities may arise, which in the areas where the strings are pressed, will cause rattling noises. There may also be a situation where there are blisters, but the lacquer has not yet flaked off. Nevertheless the lacquer will still have become separated from the wood. If one takes a fingernail and presses on it, one will discover that it is empty and soft underneath. Take a small iron file and carefully remove the blistered lacquer. Do not overshoot onto still solid parts. *[An old lacquer-powder layer is not as firmly appended to the surface and sealed onto the wood as are new layers. Even solid, non-flaking layers can sometimes be chipped off.]* Take newly mixed lacquer-powder mixture and fill in the cavities. Make smooth by using a long, soft, fine stone to lightly rub it down. *[If one rubs too hard, after a passage of time, due to thinness, the lacquer-powder mixture will easily come off. Since it is thin, blisters and flaking may also easily occur]* Do not use too much water, lest the water soak into the lacquer-powder mixture. If there are many holes, one must rub it even so that there will be no impaired sounds. Then afterwards take strained raw lacquer, and using a fine silk cloth, dip it in the lacquer and rub it over the whole body. It should be thin and not lumpy. After it is dry rub it with lacquer a few more times. If a purple rosy color is desired, use vermilion, gradually putting it in with the lacquer, mixing it in right. Thus the tuan-wen can still exist. The old traces will still be there. If the method of brushing on the lacquer is used, then the tuan-wen will disappear. If the tuan-wen are very old, then blisters and flaking will appear on the whole body, necessitating the use of this method. If the whole body is covered with blisters and hence fingering is impossible, and if it flakes easily, then removing the old lacquer cannot be avoided. The whole body must be cleaned up afresh. However sometimes just in the region of the strings, one can remove the old and put on the new, thereby preserving the tuan-wen on the sides. Or sometimes redo the lacquer on the entire top and preserve the tuan-wen on the sides and bottom, thereby making the ch'in playable and at the same time retaining the taste of antiquity. This is really "killing

[7] These are cracks in the lacquer caused by age and are much esteemed by ch'in connoisseurs. Some believe that age produces different varieties of cracks. See Volume 3, Chapter 7 for details.

two birds with one stone". Otherwise it is just a case of the "stringless ch'in" that T'ao (Ch'ien) enjoyed after he retired into seclusion. Do not bother about the music of the strings, just enjoy the beauty of the tuan-wen.[8]

Ten Principles for the Order of Construction:

1. The construction of the bulging face and of the bottom, which resembles an overturned tile, must follow the cutting out of the outer circumference and the drawing of thick lines, which are retained on the sides of the top and bottom. This is done in order to facilitate the planing down to the lines on the sides.

2. The carving out of the inside of the bottom must wait on cutting out the holes for the pool and pond and wild gees feet, and on drawing in all the boundary lines on the inside of the bottom. This will facilitate retention of wood in the proper places.

3. In the process of construction, the cutting out of the slots for the bridge, nut, ch'eng-lu, yin-t'o, and peg pool back must come before the lacquer-powder mixture is applied. Then one can temporarily put the bridge and nut in their respective positions in order to facilitate checking the strings and the sound. However when making the peg pool, first make the peg pool back and then according to its form, cut out the pool. This is done in order to insure the holes penetrate above and below and that the sides (of the back) Presumably the edges of the pool are properly a "bank") are square. Fix everything up so that it is correct.

4. The drilling of the holes from the ch'eng-lu through the top and bottom to the peg pool must wait until the holes through the ch'eng-lu itself are first drilled. After this then the ch'eng-lu may be put temporarily into its position. Make sure that it is straight. Also take the peg pool back and put it temporarily into its position on the bottom, then drill the seven holes through, with all this being in order, to facilitate the holes going all the way through without any crookedness. As for the peg pool back itself, after the seven holes have been drilled, then consider these holes as the center of the plate and make the plate according to its proper measurements.

5. Now fix up the embellishments; that is, the borders retained around the mouths of the pool and pond, the wild geese feet, the peg pool back, the han-hsuan, and the wild duck feet. The borders along the pond and pool must be put in after the bottom has been carved out and before the top and bottom are put together. As for the wild geese feet and the wild duck feet, these should be set in after the top and bottom are put together. After the peg pool back has been finished, mount it in the peg pool area. As for the han-hsuan, wait until after the top and bottom have been put together and the bottom-tail area has been evened up with the top and then set it in. In this way everything can be done smoothly and well.

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[8] That is T'ao Ch'ien (陶潛) A.D. 365-427, famous poet of the Chin period. Van Gulik, in *The Lore of the Chinese Lute*, p. 19 says: "Or he might point to the great poet T'ao Ch'ien who according to tradition, had a lute without strings or studs hanging on the wall, and who in one of his poems said: 'I have acquired the deeper significance of the lute; why should I strive after the sound of the strings?'" The author altered this wording for his own purposes.

6. Brush on and smooth the lacquer-powder mixture after making the curved surfaces on top and bottom. Wait for it to dry and then rub it smooth every time it is reapplied.

7. Carving out the belly must wait until after the lacquer-powder mixture has been rubbed smooth. This makes the testing of the sound easier. If one carves first and tests for a good sound and only then puts on the lacquer-powder mixture, then I am afraid the sound would be obstructed and changed. Also carve out the belly after all the demarcation lines on the inside have been drawn out in order to insure leaving wood in the proper spots. The procedure within the bottom piece is identical.

8. After the carving of the body and testing of the sound have been completed, then nail together the top and bottom. After this then cut back the bottom-tail area and then cut out the han-hsuan and feng-she (鳳舍) (phoenix tongue). Last of all put the lacquer-powder mixture over all of these places. Do everything step by step following the procedure.

9. Wait until after the lacquer-powder mixture has been brushed on, rubbed smooth, and the top and bottom have been put together, then put on the ch'eng-lu, bridge, nut, yin-t'o, and han-hsuan. This insures that when the rubbing is being done, there will be no obstacles. This also helps avoiding doing damage to those parts.

10. Fix up and put on the bridge, nut, etc., after bringing out the shine. The hui must be put on according to the folding process and filed off after the bridge and nut are glued down in order to make sure that they are put in the correct positions. Bring out the shine after the top and bottom have been put together and after all the embellishments have been prepared.