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**HIP Jeopardy! • Angular Harp • Improvisation Guide**

# The Rebirth of the Angular

The re-creation of a long-lost instrument relies on research going back more than 4000 years

By Bo Lawergren

**T**OMOKO SUGAWARA PLAYS an ancient harp invented nearly 4,000 years ago in Mesopotamia. Various names “angular harp,” “chang,” “konghou,” and “kugo,” the instrument can be seen in centuries-old Buddhist cave paintings and in artists’ depictions from countries along the trade route known as the Silk Road.

The harp on which Sugawara performs is a reconstruction of a kugo harp pictured on a reliquary box painted during the 6th or 7th century AD. The angular harp disappeared from the world stage some 300 years ago, was only evidenced in paintings from antiquity until Sugawara and I brought plans for a reconstruction to luthiers Bill and Catherine Campbell of Port Townsend, Washington, who worked closely with us to re-create a modern rendition that would honor the essence of an instrument that was revered for centuries.

and for most of that time they were confined to Asia. They had an advantage over arched harps because they left ample space for strings, especially short ones, and already at around 1400 BC angular harps had 20 strings.

Harp designers waited millennia to take the next logical step: connecting the angular harp’s distal ends with a pillar. They did so in the 9th century AD and created the frame (also called triangular or pillar) harp, which had a more rigid structure that allowed higher string tension and more strings. (Actually, the Greeks could claim precedence, for around 450 BC the frame appeared on Attic vases, but it disappeared 50 years later.) Frame harps were a European phenomenon, and modern pedal harps are their direct descendants. The history of frame harps spans some 1100 years, while that of angular harps lasted more than three times longer.

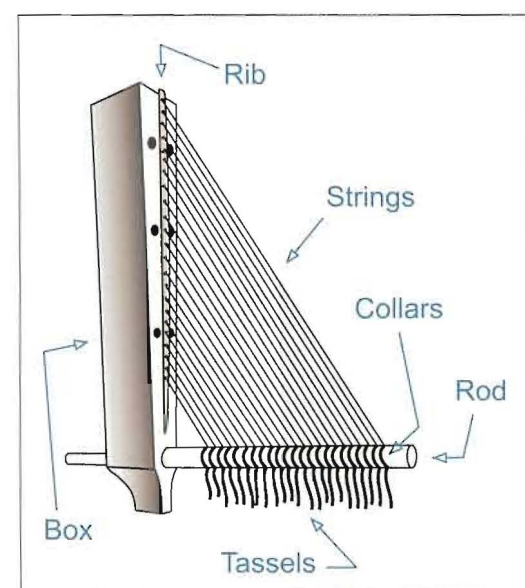
Angular harps come in two versions, horizontal and vertical, which differed not only in playing position, but also in range and sound production. Vertical harps had around 20 strings, while horizontal ones often had less than 10. Those numbers emerge when we examine surviving harps, most of which come from ancient Egypt and date to the 12th century BC. (Although strings rarely survive, one can count string holes on the body or guide pegs on the rod.) Images show that vertical angular harps were typically plucked by fingers, while their horizontal counterparts were struck with plectra.

In hindsight, the invention of the frame seems an obvious step, for the added rigidity of the structure, without much added weight, had obvious benefits. Indeed, the addition of a pillar seems less an invention than the breaking of a taboo.

## The earliest harps

The first surviving instruments were made of bird bone or mammoth ivory. Harps, which can claim to be the first documented wooden instruments, appeared around 3000 BC in Mesopotamia and Iran. They were arched – bent like hunter’s bows. Angular harps followed a thousand years later. Two pieces of wood were joined at a right angle, with the rod stuck through a hole in the body (Fig. 1). Angular harps lasted an extraordinarily long time, from 1900 BC to 1700 AD,

Figure 1



# Harp

## Angular harps of the 1st and 2nd millennia BC

The body of the angular harp is a hollow trough with the front closed by a thin sound-board made of wood or leather. Attached to its center line is a long and narrow rib to which the strings are tied. The other ends of the strings are attached to the rod by means of tuning contraptions, which originally were thick collars that could rotate around the rod. A gentle turn of the collar changed string tension and pitch. Tuning pegs were invented as late as the beginning of the first millennium AD.

Angular harps spread from Mesopotamia and became the standard type, except in India and Egypt, which, conservatively, hung on to various types of arched harps. Near Eastern sites had received angular harps already after a few centuries, but Egypt resisted them until the 15th century BC. Greece followed a different trajectory. After Cycladic harps disappeared (about 2000 BC), it had no harps until the mid-5th century BC. The absence is odd since angular harps were popular in adjacent regions to the east. The explanation may be a philosophical one, for Plato condemned instruments with many strings. (They could change mode too easily.) When they finally adopted the instrument, the Greeks subjected harps to extensive modifications and even introduced pillars, but the regular angular harp regained its dominance later in the Hellenistic world.

That world, initially forged by Alexander the Great, eventually comprised the area between Afghanistan, Italy, and Egypt, and lasted from 323 to 30 BC. Within the region communications flowed more easily than before, and long-distance travel became less strenuous. As a result, harp shapes became



Tomoko Sugawara



Figure 2

(ca. 500 BC), offer a view of horizontal angular harps. The empire incorporated the Fertile Crescent between the Mediterranean and the Persian Gulf, but its heartland lay in northern Iraq with the capitals Nimrud and Nineveh. Both had palaces with reliefs that illustrated royal exploits – battles, lion hunts, worship, banquets, and rituals. The latter occasions displayed numerous angular harps, both vertical and horizontal.

The horizontal models were always played in pairs with two players shoulder-to-shoulder (Fig. 3). Their left hands were pressed against the strings, while their right hands held long plectra. Three examples are shown at the top of the figure, and line drawings clarify the playing technique below. The Assyrian reliefs have been known for 150 years, but similar extant harps have only recently been excavated in the Xinjiang Uyghur Autonomous Region in northwestern China. These harps closely resemble the Assyrian ones in shape, size, and apparent playing posture, but they date to the 5th century BC – two centuries after the Assyrian ones.

About 10 of these Central Asian harps are now known. Since their find spots lie on the rim of the Eurasian steppe, one might call them “steppe harps.” All have five strings, whereas Assyrian ones had nine. Most likely, nomadic tribes such as the Scyths brought the harps from Iraq to the western edge of China. During the 8th century BC, Scyths served in the Assyrian army and could have seen, and adopted, the harp. Highly portable, it could have moved around fast and far on horseback.

Like the vertical angular harp, the nine-stringed horizontal angular harp arose around 2000 BC in Mesopotamia. Some five centuries later it was used to demonstrate Mesopotamian tuning theory, which used diatonic scales like ours. But moving east in the 5th century, it retained only five strings, which implies it was no longer associated with the Mesopotamian tuning theory. Most likely, Central Asians who adopted the instrument were not interested in its theoretical baggage.

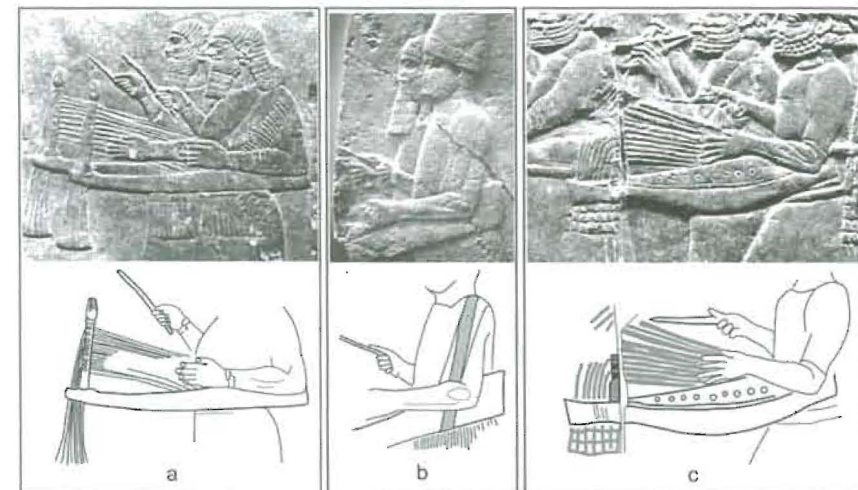


Figure 3

standardized, and since the Hellenistic world included areas rich in harps, angular harps of standard shape spread across the region. Roman campaigns in Asia Minor brought the army in contact with exotic eastern goods. According to Livy, soldiers brought back sumptuous furniture after a successful campaign in 187 BC, and they acquired a taste for eastern exotica. Female players of angular harps were favored at Dionysian symposia in Rome (Fig. 2).

### Assyrian harps, 800-400 BC, and their influence in China

The harps of the Assyrian empire (900-650 BC), and those of early Chinese history

Figure 4



### Sasanian and Islamic harps, 224-1600 AD

During the Sasanian period (224 to 651 AD), Zoroastrianism was the state religion in Iran, and epics told of courtiers who loved harps. But in 643 AD Islamic forces conquered Iran and Zoroastrianism ended, although Iran's highly developed musical culture survived and began to assert influence on the Muslim world. Its angular harps spread to Iran, Afghanistan, Uzbekistan, Iraq, Turkey, and Egypt. When Muslim forces conquered the Iberian Peninsula in the 8th century, the angular harp followed and gained a foothold in Europe. But Islam was pushed out seven centuries later, and so were angular harps.

By the 1250s Mongolian armies from Central and Eastern Asia vanquished Iran and Iraq in bloody battles and installed their own rulers. They quickly adopted local Iranian customs, including the love of harps, and were keen to prove themselves natural proponents of the heroic, cultured, and refined ways of Sasanian rulers. A story about the Sasanian prince Bahrām Gur had been published in 1010, and the Mongols commissioned many illustrated copies of the book. The story of Bahrām became popular, and many knew that his favorite companion was Āzādāh, who played the angular harp. One day the princely couple went hunting on camelback. He sat at the front, she at the back. A gazelle came into view, and Āzādāh asked Bahrām if he could pin an arrow through its hind leg and ear. First he shot a pebble against the ear; when the gazelle scratched it, he followed with an arrow through leg and ear. Āzādāh accused him of animal cruelty, and Bahrām threw her off the camel and she died. Illustrations like Fig. 4, which shows Āzādāh before and after her fall, made harps a familiar sight.

Various ateliers produced these books, and the type of harp shown varied with the location. Two types can be distinguished. One was popular at the ateliers of western Iran and Iraq, the other in eastern Iran, Afghanistan, and Uzbekistan. The former has a short tail and a body with rounded corners. The latter

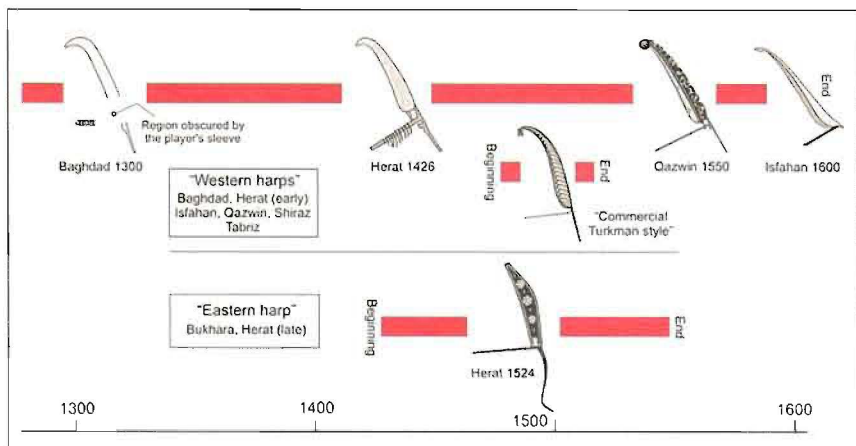


Figure 5

has a long undulating tail and a body with sharp angles (Fig. 5). Most likely, it was the model known to Darwish Ali Changi, who lived in Bukhara ca.1550-1620. His *Treatise on Music* contains Central Asian legends about musical instruments. He calls the harp the “bride of musical instruments,” an expression that is still familiar to musicians in Central Asia – although the instrument disappeared many centuries ago.

Although only two basic models existed, there were a considerable number of small variations around these basic structures. Many details can be singled out, but here I illustrate only how the uppermost part of the box has been drawn (Fig. 6).

Figure 6

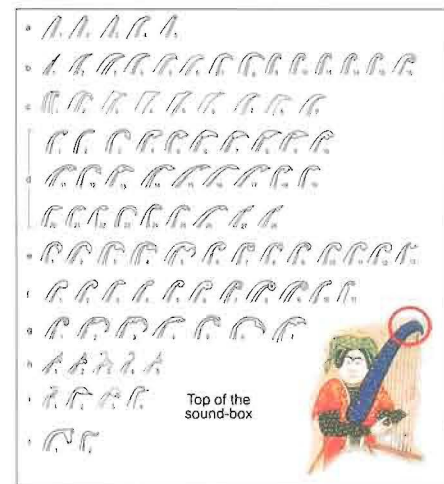


Figure 7



Each row in the figure contains tops with similar features: in row (a) the top is square-cut; in row (b) it is a point; in (d) and (e) it becomes a bird's head. Fancier shapes appear in the lower rows, some of them quite amusing. Such richness of form is likely to be common when instruments are handmade.

By 1600 the images in Iranian books show increasingly odd models with features that deviate radically from the norms established centuries earlier. Presumably, the deviations indicate that harps had died out in Iran, but painters felt obliged to promulgate the topos. Without physical objects to copy, they relied on faulty memory.

In Turkey the harps continued for another century. About 1660, Ewliyâ Çelebi (1611-*ca.*1669) made an inventory of players and makers of instruments in Constantinople. For harps he found 10 makers, two shops, and 10 players and noted: "the sound of harps is astonishing.... [F]ew play it because it is a difficult instrument." Surely, its days were numbered. Only 10 harp players in a city where Çelebi counted over 2,000 lute players!

It is curious that one of the most realistic depictions comes from this late milieu. It was drawn by the Danish artist Melchior Lorck in 1576 (Fig. 7). He had lived four years in Constantinople, roughly a century before Çelebi's inventory. The front end of the rod rests against the floor, a position that stabilizes the large harp. Lorck's harp has more than 30 strings tuned with pegs occupying two rows, one above the other. This arrangement also occurs on pictures made by native Turkish artists and seems to be a distinctly Turkish feature (Fig. 8).

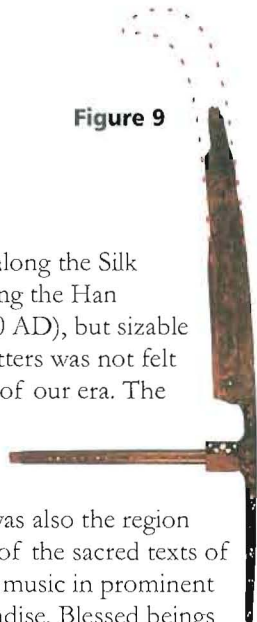
### The Silk Road and the Far East, 500 -1100 AD

Steppe harps flourished *ca.*500 BC, long before the Silk Road was established. They never reached the heartland of China and had no influence on the diffusion of vertical harps that began when the Silk Road was established. Another religion, Buddhism, was responsible for the diffusion along the Silk Road.

Figure 8



Figure 9



Large scale trade along the Silk Road developed during the Han Dynasty (206 BC-220 AD), but sizable effect on musical matters was not felt until the 6th century of our era. The western end of the road passed through areas familiar with angular harps. This was also the region that produced many of the sacred texts of Buddhism. They put music in prominent places, including Paradise. Blessed beings heard wonderful music, experienced pleasant scents, and languished in gently flowing streams. The sacred texts named the instruments – harps, lutes, flutes, and percussion – familiar to those who wrote them. Ancient Chinese instruments (zithers, large drums, tuned chimes, bronze bell) were largely ignored. To emulate the Buddhist vision, Western instruments had to be imported, cultivated at Buddhist courts, and adopted by Chinese musicians.

The greatest appreciation of angular harps in China occurred during the Sui (581-618) and Tang (618-907) Dynasties. From there they spread to Japan and Korea under slightly different names (*konghou* in China, *kego* in Japan, and *gonghu* in Korea) but were essentially the same type of instrument as anywhere else on the Silk Road and in Western Asia. But Buddhism declined in China after 1100 AD, and so did harps.

In Japan, harps lasted a relatively short time, the 8th century, and left two extant fragments in the Shōsōin Imperial Treasury House in Nara. Both show only the lower parts of the bodies. Their upper parts may have looked like the hatched line in Fig. 9, which is based on images of other Asian angular harps. Each fragment has room for 23 strings, and the bodies are made of a single piece of royal paulownia wood. The rod was made of Japanese persimmon or mulberry. These harps were probably made in China and sent to Japan as royal gifts for the eye-opening ceremony of the great Buddha in the Tōdaiji Temple, Nara, in 752. Since the upper parts of the fragments

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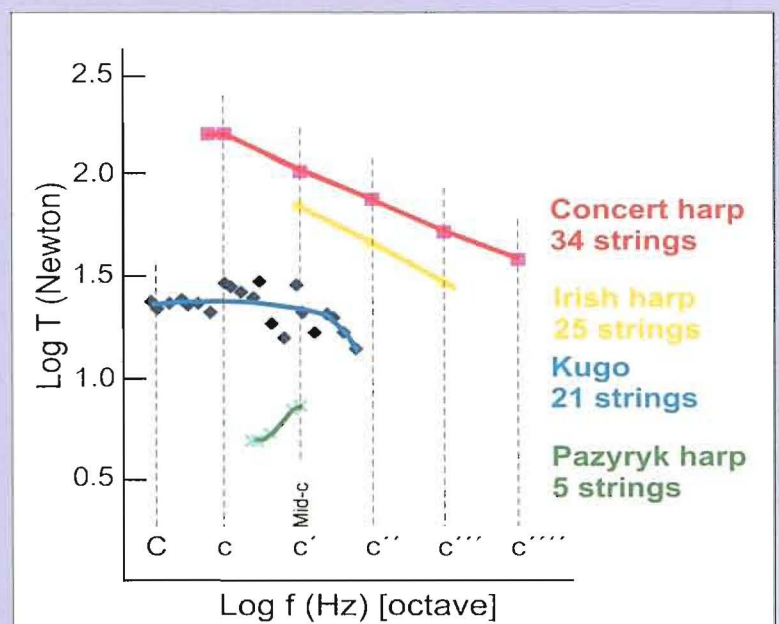
## String Tensions

How do string tensions compare on different types of harps? Angular harps have low mechanical strength and – one would expect – low average tension-per-string. Measured values are given in the figure, where the vertical axis shows string tension expressed in Newton units. The scale of the horizontal axis is chosen to give equal-spaced octaves.

The 20th-century concert harp – a Salvi Diana of which only the four top octaves are measured – has the highest string tension. It is followed in descending order by a small frame harp (a Clark Irish Harp built around 1915), a vertical angular harp (built 2003), and a replica of the horizontal angular harp (a steppe harp dated ca.350 BC), excavated at Pazyryk. For the string with a pitch of middle C, the tension is 4.4 times less on the angular harp (*kugo*) than on the concert harp. On the Pazyryk harps it is 16 times less.

If the pitches of the strings are to follow a diatonic scale, harp builders need to select diameters, material, tensions, and lengths judiciously. With tension that is too high, the harp will collapse, and with too low, the string will be floppy. Since frame harps can tolerate high tensions, the choice is less critical there than on angular harps, where the long strings, in particular, easily can break the structure. They are attached far from the point where the rod joins the body and can exert high torques around that point. This circumstance restricts the tension of the long strings of angular harps (the left end of the blue curve). On frame harps there is no such restriction (red and yellow curves).

Tension also affects loudness, a quantity makers may want to maximize. Loudness depends on many factors, but one is the characteristic string impedance ( $Z$ ), proportional to the square root of the tension and the mass of the string. Since angular harps have low tension, the  $Z$ -values and loudness are low. The string parameters must be chosen to minimize tension and torque while maximizing  $Z$ . Since ancient strings were tuned by twisting collars around the rod, the limited amount of force attained by human fingers imposes further limits on the string tension.



# Angular Harps

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are missing, one cannot determine the size of the original harps, but they appear to be much larger than the harps shown in Asian illustrations. Perhaps the size reflects the grandeur of the occasion and the temple.

## **An angular harp replica**

There are many representations of vertical angular harps and most agree on the size of instrument. If a player holds the vertical harps in a comfortable position, the rod will be near the level of the player's navel and the box will rise slightly above the head. However, the Shōsōin harps are larger, and they have stood as models for many replicas in Japan. A more typical harp was built for Tomoko Sugawara. It is based on an image on a reliquary box found at Kumtura on the Silk Road. The box was collected by the Ōtani expedition, which dated it to the 6th or 7th century and deposited it in Tokyo National Museum. Details too small to be seen on the drawing were taken from the Shōsōin fragments.

One of the Shōsōin harps has tuning pegs and the other tuning collars. Collars were more common and have older roots, but the former, easier for modern players, were chosen for the replica.

## **Music for angular harps**

Only rarely do we know the music that may have been played on instruments as old as this, but here we are lucky. Notation existed during the last few centuries of the angular harp. China had it during the Tang dynasty, Spain during the 13th century, and a tune from 1300 survives from Iran. Tomoko Sugawara has recorded these pieces together with several modern commissions on a CD called *Along the Silk Road*. Many will agree with Ewliyā Çelebi's 350-year old pronouncement: the sound is astonishing. 

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Bo Lawergren is emeritus professor of physics at Hunter College (City University of New York) and is currently writing a book on Music Archeology.

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