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From Organics to Ceramics? Exploring Organic Skeuomorphism in the Later Neolithic in Northern China

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Abstract Skeuomorphism in Chinese ceramics is a widespread phenomenon with examples known from the early Shang dynasty (sixteenth c. BC) through to modern times, and with metal, lacquer, jade and glass vessels all serving as models for the ceramics they inspired. With Neolithic pottery in China, however, the presence of skeuomorphic design is more difficult to assess. Nonetheless many Neolithic ceramics from northern China seem to embody influences from materials as various as basketwork, birch bark, leather and horn. This suggests that extensive skeuomorphism may once have operated at a much earlier stage in China's ceramic history than the Bronze Age – namely the Neolithic period.

Keywords Skeuomorphism. China. Neolithic. Birch-bark. Basketry. Leather. Horn.

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> Integrating the organic and inorganic components of a site, and deploying an augmented idea of the kind of material culture being produced, allows for broader interpretive possibilities.
> (Hurcombe 2014, 161)

1 Introduction[1]

In the long and varied history of Chinese ceramics the principle of skeuomorphism has been an important and enduring theme. The shapes of metal vessels in particular have been copied in clay for more than three thousand years with cast bronze serving as the preferred models in the Bronze Age (sixteenth to the fourth c. BC) and beaten silver and gold vessels in the Tang and Song dynasties (seventh to thirteenth c. AD) (Medley 1972; Rawson 1989; Vainker 1991, 109). In the late eleventh c. AD some glazed imperial Ru ware bottles were made in the shapes of imported Islamic glass, while black-glazed and russet-glazed cups and cup-stands were made by the Ding ware potters of northern Hebei province that closely resembled the forms and the colours of contemporary lacquer wares. Similar correspondences can be traced through the post-Neolithic history of Chinese ceramics while, in some cases, particularly with China's more prestigious wares such as Guan ware, skeuomorphic design seems to have been the rule rather than the exception. In the case of Guan ware influences from hammered silver, archaic cast bronze, lacquer, jade, and imported glass, are all evident in the fine imperial celadon wares made at Lin'an (now Hangzhou City) in the later Southern Song dynasty (1127-1279) (Scott 1989, 40-4).

But how should we take account of any influences on Chinese ceramics from vessels made from organic materials that have not survived through gradual decay over the millennia, and are therefore missing from the archaeological record? This is particularly true of vessels made from materials such as horn, wood, bark, basketwork and leather, all included by Linda Hurcome in 'The missing majority', that is the once abundant, but now long-lost, organic artefacts of the Neolithic world (Hurcome 2014). Northern China, in particular, has a rich and varied history of ceramic production that, from the Bronze Age onwards, shows abundant evidence for skeuomorphism in its ceramic design. It therefore seems reasonable to test the skeuomorphic principle with surviving Neolithic ceramics from this same region, but in this case against the background of a lost material

1 Acknowledgements: sincere thanks to Dr Peter Hommel, University of Liverpool, for useful discussions on this subject, and for some valuable references, images, and suggested edits to the text.

culture that may have made extensive use of containers and vessels made from organic materials. There is also an added interest, when dealing with this part of China, that the Neolithic north gave way to the early Bronze Age – a change epitomised by China's first cast ritual vessels of the early sixteenth c. BC and excavated from sites such as Yanshi in Henan province (Deydier 2018). These early bronzes present their own challenges with regard to form and ornament, with contemporary vessels made from perishable organic materials perhaps also playing some part in their unusual designs.

2 Skeuomorphism in Chinese Neolithic Ceramics

2.1 Basketwork

Some very early pottery vessels that seem to show signs of skeuomorphism may have used baskets as their models (Hommel 2013, 667). Examples are known from the Russian Far East and made by hunter-gatherers at the end of the last Ice Age, c. 11,000 to 5000 BC. Some are thought to have been moulded inside actual baskets, as basketwork impressions survive on their surfaces (Zhushchikhovska 1997, 160-2). From China itself, is a U-shaped vessel from a Hongshan culture site that seems to have been made in a typical basket-ware form **[fig. 1]**. The vessel dates from c. 4500-3000 BC and was excavated near to Chifeng in Inner Mongolia. Its outside surface has a basket-like texture, while its rim is formed in a typical basketwork style **[figs 1-2]**.

Figure 1 Hongshan culture vessel from Xintai, near Chifeng. Mid-fifth to the fourth millennium BC. H. 25.8 cm. Reproduced from Institute of Archaeology, CASS, 1993, 110

Figure 2 Picking basket, China, made from wicker and wood. Modern. H. 30 cm, W. 32 cm. Image courtesy of Couleurlocale

2.2 Birch Bark

Also from the Chifeng region, but in this case from the somewhat earlier Zhaobaogou culture (c. 4900 to 4700 BC), is another pottery vessel that might be suspected as deriving from a basket-work form. This example has an oblong base and a round top, which are characteristics of many basketwork designs [figs 2-3]. However, another interpretation is that this piece might be following a birch bark original – birch bark being a very ancient and versatile material for vessel-making (Hommel 2013, 667; Nelson 2002; Orsini et al. 2015). Containers made from birch bark exploit the principle that large vertical sheets can be unpeeled from birch trees by using high and low ring-cuts with one vertical cut to connect them. Birch bark has the nature of a thin natural plywood that can be heated, steamed or soaked in hot water to make it flexible. Large and long-lasting vessels can be made from this material through a type of 'bark origami' (Fletcher et al. 2018; Yarish et al. 2009). Birch bark is naturally waterproof and rot-resistant, and may also be used to hold liquids **[fig. 4]** (Ward et al. 1996). As the bark cools and dries it becomes tough and rigid as its resins harden. Birch bark tar, made from the dry distillation of the bark itself, is also a very ancient and useful adhesive that is strong, flexible and waterproof, and considered superior to pine or spruce pitch (Koller et al. 2001).

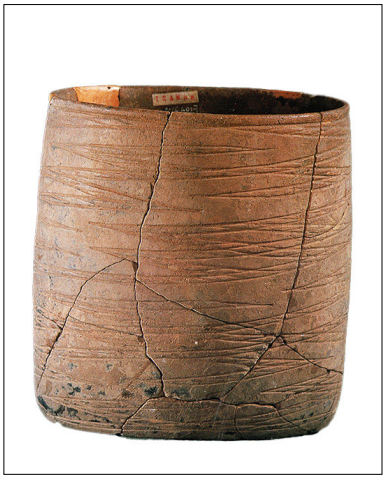

Figure 3 Pottery vessel with an oblong base and a circular top. Zhaobaogou culture near Chifeng, Inner Mongolia. C. 4900-4700 BC. H. 20.5 cm. Reproduced from Institute of Archaeology, CASS, 1993, 106

Figure 4 Birch bark water bucket with oval top and a wooden handle, 'Niatush', Japan. Ainu, Yezu, Volcano Bay Hokkaido. Pre-1900 H. 32 cm, W. 16 cm. Pitt Rivers Museum, University of Oxford

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2.3 Leather

When considering leather prototypes for Chinese ceramic vessels, it is possible to begin on firmer ground and at much later dates than the Neolithic, with numerous potential examples of glazed northern ceramics from the late sixth to the twelfth centuries AD. For these vessels at least, the influences of leather prototypes on ceramic form and detail are widely accepted and discussed, with modern survivals of similar leather forms used for comparison (Department of Archaeology Peking University (ed) 1992, 258-9). Leather working in northern China, particularly among its pastoralist peoples would have been widespread with its products traded within more settled societies. An advantage of these later leather-inspired ceramics, from the perspective of the present review, is that they allow familiarity to develop with the forms and details of typical leather vessels that have been translated by potters into the very different medium of clay **[figs 5-6]**.

Figure 5 Xing whiteware flask, Tang Dynasty (618-907AD). Exhibited in Beijing in 2013. Photo, courtesy of Kang Baoqiang, Palace Museum, Beijing

Figure 6 Olive-green glazed flask and cover. Liao Dynasty (907-1125) H. 30.5 cm. © Christie's / Bridgeman Images

2.3.1 Neolithic Leather Working

For Neolithic skin-workers de-fleshing, de-hairing and scraping would have been essential first stages, but they would then have been faced with two problems common to the practice. The first is the tendency for the skins to stiffen, shrink and harden as they dry, while the second is the risk of rapid decay, particularly when the

skins become wet. Thus, structural preservation of the material and restoration of its original flexibility have been prime concerns for the multitude of skin-working techniques that have developed through the millennia.

With regard to preservation, skins have been traditionally cured by exposing them to wood- or grass-smoke and/or by lengthy immersion in liquors made from tannin-rich organic materials, especially infusions of tree bark. Flexibility can be restored by rubbing fat-rich materials such as animal brains, fish oil, egg-yolks, or fish-eggs into the skins, and this process can also render them waterproof. Countless variations on these principles can be traced through early material cultures, with climate, local fauna and flora, and the intended uses for the processed skins, all serving as factors in determining the specific techniques adopted (Kemper 2020; Hurcome 2014, 80-1).

Once the skins are prepared, they can then be made into three dimensional objects in an economical and effective way, usually by cutting the leather sheets to a pattern and stitching the edges with tough and fine cord, root-fibre or sinew. This process usually leaves raised welts where the various sections have been joined **[fig. 7]**. Handles (when needed) can be made by folding the leather to increase its thickness or by plaiting or twisting leather strips to make more substantial sections. Handles can also be made as continuations of the major parts of the vessels, as with the leather prototype for the Xing ware flask in fig. 5. The advantages of leather over ceramic, once the difficulties of making the vessels have been mastered, is that the objects can be light, 'unbreakable' and long-lasting, making ideal waterproof containers for liquids such as water or wine.

Figure 7
Modern leather purse. H. 22 cm, W. 19 cm. English, Bristol, 2000. Photo by the Author

2.3.2 2.3.2 Shandong Neolithic Ewers

There are few objects in Neolithic China's rich and complex ceramic history more striking in form than some ewers of the later Shandong Longshan culture, c. 2500-2000 BC **[figs 8-9]**. These were made in what is now Shandong province. They have been excavated at sites such as Dawenkou, Ti'an and at Yanguanzhuang near to Weifang City in central Shandong (Druc et al. 2021, 2). They are sometimes described as 'bird like' because of their large and exaggerated 'beaks' and tall legs.

They are all trilobate, with some showing udder-like fullness while others are simply stubby feet attached to the main bodies of the ewers. They tend to be relatively large (up to 40 cm tall), and have been described as 'ritual vessels', and were perhaps once used for serving wine (McGovern et al. 2004, 17593; McGovern et al. 2005, 266). They are often made from pale-firing kaolinitic clays rather than from the reddish- or grey-firing loessic materials that are more abundant in Shandong province. Alternatively these darker clays could be covered with pale clay-slips to give an overall white impression (Druc et al. 2021,7). Later examples show signs that they were constructed from multiple sections that had been thrown on the fast potter's wheel **[figs 8-9]**.

Figure 8 Neolithic Shandong Longshan Culture *gui*. Excavated at Lingchengzhen, Rizhao County, Shandong. C. 2500-2000 BC. H. 36.8 cm. W. 20.4 cm. Arthur M. Sackler Museum, Peking University. Photo by the Author

Figure 9 Neolithic Shandong Longshan culture *gui.* C. 2500-2000 BC. From Yanguanzhuang, Weifeng Municipality, Shandong. H. 31.7 cm. W. 19.8 cm. Arthur M. Sackler Museum, Peking University. Photo by the Author

2.3.3 Possible Sources For the Ewers' Forms

It seems feasible that these very complex Shandong ceramic ewers were copying vessels that were originally made by the cutting and joining some type of sheet material, with riveted bronze cautiously proposed by Watson in 1973, although with appropriate caveats (Watson 1973, 58-9). However, rawhide or leather may be more likely candidates as references to these materials seem evident in their applied 'welts', in the twisted 'ropes' of their handles, and in the 'nail-heads' that appear where strengthening details may have been applied to the original vessels. Even so, a problem with this hypothesis is that it pre-supposes the presence of sophisticated skin-working traditions in the Middle Dawenkou and Longshan cultures, for which little evidence seems to have survived. Although leatherworking has been proposed for two important Neolithic sites in north China – namely the large Middle Neolithic village of Jiangzhai in Shaanxi province and at fourth millennium BC sites near Chifeng in Inner Mongolia (Xishuiquan and Baiyinchanghan) – Dawenkou leather working remains a less examined subject (Peterson et al. 2010, 5757; Peterson, Shelach 2012, 284). Nonetheless, some hints for skin-working within the Dawenkou culture may come from ceramic drums found in Shandong province that Lawergren suggests were originally topped with skin (Lawergen 2006, 110-11). With regard to the animal skins available to the Dawenkou people, domesticated pig remains have been found at nineteen Dawenkou sites dating from c. 4100-2600 BC. while Kwang-chih Chang mentions that pig, cattle and sheep remains have been recovered from later Dawenkou sites in Shandong (Jin 2009, 121-2; Chang et al. 2005, 96).

2.4 Vessels Made from Horn

In one respect horn-working presents an easier option for vessel making than leather in that horn-workers are already in possession of hollow forms that can be modified or merged to make larger vessels. This may have some relevance to some dramatic ewers excavated from the Dadianzi site of the Lower Xiajiadian culture in Auohan banner in Inner Mongolia and dated to c. 2000-1000 BC **[fig. 10]** (Institute of Archaeology, CASS 1993, 124).

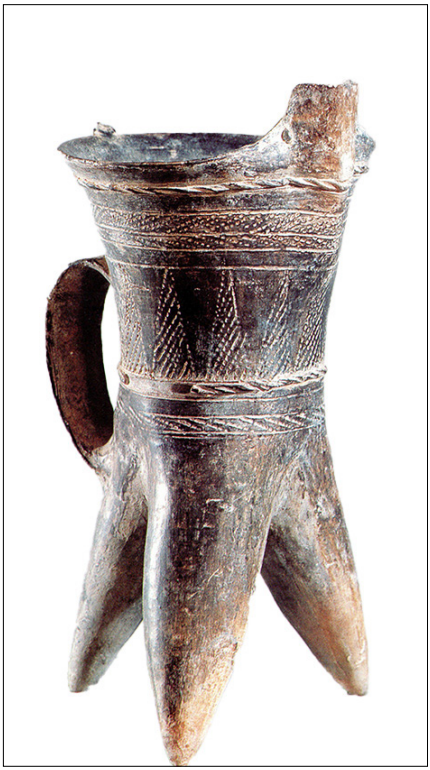

Figure 10
Late Neolithic Xiajiadian culture ewer from tomb 612. Dadianzi. C. 2000-1000 BC. H. 27.2 cm Reproduced from Institute of Archaeology, CASS 1993, 32

2.4.1 Working Animal Horn

Animal horn becomes plastic when heated and sections can be fused together when soft (often above 300°C). Horn can also be glued effectively when cold. The Dadianzi ewers appear as if the originals may have been made from separate horn elements that were merged at their edges and then tightly bound with a suitable material, perhaps rawhide **[fig. 10]**. Superficially the Dadianzi ewers from Inner Mongolia share many features with the Shandong vessels, but closer study of their details suggests an imitation of horn- rather than hide-working. The difference extends to the handles, which are flat, rather than appearing like twisted rope or leather. Other features that may be evoking horn originals are the vessels' burnished surfaces and their lightly scratched 'scrimshaw' style of ornament. A further interesting aspect of the Xiajiadian culture ewers from Tomb 612 at Dadianzi is that they were found together with a lacquered wooden cup – a rare organic survival from China's Neolithic past.

A few hundred miles to the west of Shandong, on the great central plain, traversed by the Yellow River are important sites from the Erlitou period, such as Erlitou itself (Yanshi), Luo Damiao, and Dong Gangou near to Luoyang (Deydier 2018, 10). It is from these sites that some of north China's earliest cast bronze vessels have been excavated (Han et al. 1954). The later Longshan ceramic vessels from the region are varied in form and function but, from the standpoint of the present discussion seem to owe more to horn than to hide in their essential designs and details **[fig. 11]**. More specifically, the use of Water Buffalo horn might be suspected, perhaps from the distinctive short-horned north Chinese species (*Bubalus mephistopheles*), which is now extinct **[fig. 12]** (Yang et al. 2008). It may also be significant that many of these drinking or pouring vessels have rims that rise opposite to their handles. This can suggest the shape taken by a buffalo's horn where it meets the animal's skull, a feature that may have been exploited as pouring-lips on some horn-made originals **[fig. 11]**.

Figure 11 Two grey pottery tripod ewers. Erlitou period. Sackler Museum, Peking University. Photos by the Author

Figure 12
Bubalus mephistopheles skull from the Tianluoshan site, displayed at the museum at Hemedu. Image from Wikimedia Commons, courtesy of Mx Granger

2.4.2 Late Neolithic/Early Bronze Age Ceramics from Erlitou Sites

In the history of horn-made vessels the simplest and most ancient shape is the unmodified curved animal horn, with its earliest known representation seen in the Upper Palaeolithic 'Venus of Laussel' (c. 23,000 BC), a *bas-relief* figure discovered within a cave in the Dordogne department of France (Duhard 1991). In China itself an exact horn skeuomorph in ceramic, and from the Dawenkou culture, is displayed in the Jinan Museum in Shandong **[fig. 13]**.

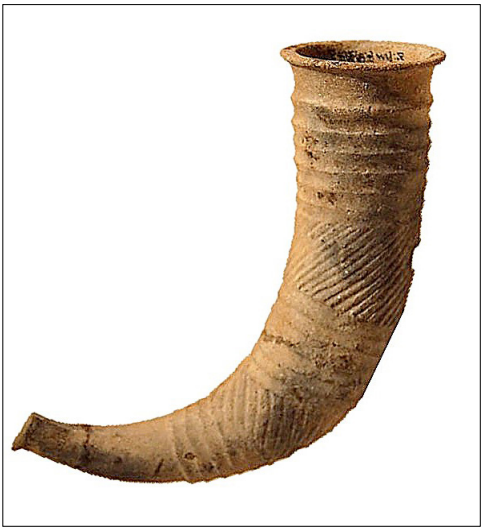

Figure 13
Ceramic horn from the Dawenkou culture, Juxian, Shandong. Perhaps an end-blast trumpet Jinan Museum, Shandong. Image courtesy of Peter Hommel

2.4.3 The *Gu* Form

A later important horn-form that appears in many cultures worldwide is the beaker with a flat base. This latter style may also be suspected in some vessels from Erlitou sites, although in this case the shapes could be interpreted as combinations of two horn-made beakers, with one inverted to make a tall hollow foot **[figs 14-15]**. This feature, combined with the banded detail where hollow foot and cup may have been joined, is often seen in later cast-bronze versions of the same footed-beaker form **[fig. 16]**.

Figure 14 Pottery *gu* (wine vessel) Erlitou period. Excavated at Yanshi, Henan Province. C. 2100-1600 BC. H. 17.7 cm. Reproduced from Institute of Archaeology, CASS 1993, 124

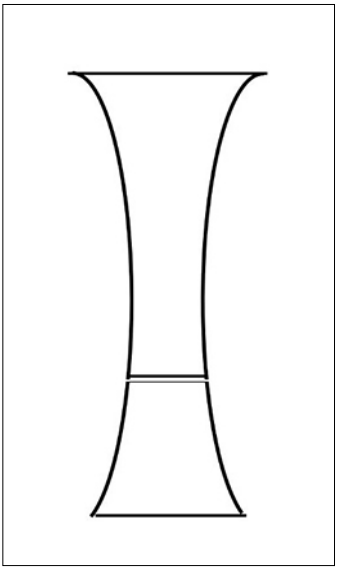

Figure 15 A *gu* form can be made from horn by joining two beaker-shapes and binding the join. Image by the Author

Figure 16
Bronze *gu*, later Shang dynasty. C. 1150-1050 BC. H. 32 cm. © Victoria and Albert Museum, London

2.4.4 The Rhino Horn Cup

But perhaps the most iconic of all horn-based forms in China's material culture must be the Rhino horn cup, and these have considerable antiquity in China. As Jeannie Thomas Parker notes:

> Literary evidence confirms the fact). that by the Eastern Zhou Dynasty at the latest, the Chinese were using wine cups made out of rhinoceros horn. (Parker 2013, 103)

Lander and Brunson also note:

> Bones identified as rhinoceros or Sumatran rhinoceros were identified at Early and Middle Neolithic Dadiwan (Gansu), Middle Neolithic Guantaoyuan and Zijing (Shaanxi), Middle Neolithic Xiawanggang (Henan), Bronze Age Erlitou (Henan), and Bronze Age Anyang (Henan). (Lander, Bronson 2018, 301)

Rhinoceros horn is a densely compacted keratinous composite that grows as a solid mass over a fleshy bump on the nasal bone of the animal. As a result it forms a natural cup that can be easily finished by cutting and cleaning **[fig. 17]**. The odd geometry of the top of the *jue* cup seems to echo the way that the horn grows from the animal's nasal bone **[fig. 20]**. Late Neolithic pottery cups in *jue* form also have the characteristic 'sawn-off' flat base of the rhino-horn cup **[fig. 18]**. There is a sense too that the horn prototype (if it existed) may have been deformed pyro-plastically (i.e. pinched after heating) to give a pouring lip, a feature that is also evident in Erlitou ceramics and bronzes **[figs 18-19]**.

Figure 17
Plain rhino horn cup, China. Sixteenth c. AD or earlier. H. 8.9 cm, L. 16.5 cm. Museum of East Asian Art, Bath. Heritage Images

Figure 18 Pottery *jue*,from the third stratum at Erlitou. Sixteenthh c. BC. H. 13 cm. Reproduced from Kaogu (1965), 5, pl. 4:9)

Figure 19 Bronze *jue* (wine cup). Early Shang Dynasty, Erligang period, fifteenth to fourteenth c. BC. H. 14.6 cm, W. 13.5 cm. Also bronze *gu*, early Shang dynasty, Erligang period. Fifteenth to fourteenth c. BC. H. 16.8 cm.

Figure 20 Sumatran rhinos (the smallest member of the rhino family) were abundant in north China until later in the Shang dynasty. Https://www.worldwildlife.org/photos/sumatran-rhino-new-hero-image

2.5 Erlitou and Early Shang Bronzes

The Erlitou culture and period are often regarded as one and the same as the Xia dynasty, the first of three early Bronze Age dynasties in traditional Chinese chronology – namely Xia, Shang and Zhou. Xia territory was conquered by the Shang, probably in the sixteenth c. BC and the region that is now Henan province and its environs became an advanced and powerful state that came to dominate northern China for some five hundred years. Bronze ritual vessels were developed from those pioneered by the late Erlitou culture and these became a focus for Shang religious practice when used for ritual drinking and feasting. These same ritual bronzes were also buried in elite tombs for use in the afterlife (Rawson 2023, 77).

The *jue*, *jia* and *gu* forms were initially three of the more important cast bronze vessel-types and were probably used for the warming, serving, and drinking of wine. As proposed above, it seems possible that both the *gu* and *jue* forms may originally have been made from horn, so it could be cautiously proposed that ritual vessels made from horn may have once held an equal, or perhaps superior, status to ceramics in the Erlitou culture, before they were displaced by bronze vessels of similar design.

3 Conclusion

The main theme for this review is that the widespread skeuomorphism that is evident in Chinese ceramics from China's Bronze Age to the present day may not have started in the mid second millennium BC but may also have been a feature of Chinese ceramics made during the Neolithic period. However, the prime difficulty in extending the skeuomorphic principle into this earlier timeframe is that most non-ceramic models for form and ornament would have been organic, and now lost through gradual decay over the millennia. For evidence of skeuomorphic design in Neolithic northern China we need to look instead at the ceramics' forms and details for clues to possible organic prototypes.

In the light of this approach, many of the earlier north Chinese Neolithic vessels suggest that woven baskets or folded bark containers may have served as sources for imitation. By contrast, the extraordinary 'bird-shaped' ewers of Shandong province seem to be invoking vessels that may once have been made by the folding and joining of some kind of sheet-material. The most likely candidate in this case seems to have been cured animal skin rather than bark or beaten metal, but this particular perspective does involve some large assumptions regarding animal-skin working in north China in the later Neolithic. Other Neolithic ceramic traditions of north China provide strong hints for the presence of horn-made vessels as prototypes. In this case the skills involved in creating any horn originals would have been the cutting, joining and pyro-plastic distortion of existing animal horn.

There is also a possibility that horn may once have served as an élite material in some later Neolithic cultures in northern China, and some evidence for this may be found in the forms of some of China's earliest cast bronzes. These are the celebrated ritual vessels of the Erlitou or Xia culture, excavated from sites such as Yanshi in present-day Henan province. These early bronze vessels show complex and eclectic shapes that have long puzzled historians of Chinese culture. However, when worked-horn ritual vessels are considered as possible prototypes for these designs then their forms may become more understandable. Of course, while pursuing this line of reasoning one has to bear in mind the well-known art-historical trap of finding a parallel and then considering it an influence, although, conversely, it may also be remiss to ignore potentially significant associations (Wood 2013, 48).

A further implication of the 'organics to ceramics' hypothesis is that our general sense of the northern Chinese Neolithic period as an 'age of ceramics' may be a rather partial view. With so many organic containers suspected as models for ceramic production a much richer and more varied range of Neolithic vessels may once have existed. And, from what we know of their modern equivalents,

many of these organic containers would have been lighter, stronger and altogether more practical than the Neolithic ceramics that they may have inspired.

Other aspects of this subject that might bear further study, should some of these proposals be accepted, include the question of why the potters of northern China felt the need to copy vessels made from other materials so faithfully, and in such careful detail, and how these often very complicated forms were successfully translated into clay? These problems have more to do with anthropology and applied ceramic technology, respectively, so are rather beyond the scope of this brief survey, although they are still of considerable interest (Blitz 2015). There are also larger questions regarding Neolithic ceramics within the rest of China, as this discussion has been confined to the Neolithic north and northeast **[fig. 21]**. With regard to the larger Neolithic world, cultures as far apart as East Africa and the southeast regions of the United States can also show convincing evidence for skeuomorphism in their Neolithic ceramic vessels (Blitz 2015; Grillo et al. 2022). However, as discussed above, the Neolithic ceramics and early bronze vessels from northern China seem to provide an unusually rich field for study, particularly when considering the complex evolution of three-dimensional design within China's larger cultural history.

Figure 21 Neolithic ceramics discussed in the essay. Figure prepared by the Author

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