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Digging for Meaning

Research from the Oxford School of Archaeology

A Podcast

Episode 4

Dr Victoria Sainsbury on: *“Social Status and Recycling in Bronze Age China”*

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Recycling is one of the most important strategic policies for the green economy and for the future of our planet, but recycling isn't new. But what does using recycled materials say about you and your place in society?

Welcome to the University of Oxford, School of Archaeology podcast 'Digging for Meaning'. I'm Dr. Victoria Sainsbury, and I'm going to talk to you about recent work by the FLAME team on the site of Anyang, led by Dr Ray Liu, on recycling and social status in Bronze Age China.

As discussed in one of our other podcasts, 'Did the Romans' Recycle?', the human behaviour of recycling can be a useful tool to diagnose our own past and the lessons we learned from our history can also guide ourselves now. The modern focus on recycling is because, in many cases, we have consumed huge swathes of the environmental resources that we need for production or biodiversity. However, the choice of recycling, both now and in the past, is also a complex human choice – not just one of either economics or ecology. Even now, recycling and the perception of it is inexorably linked with the social, cultural and political aspects of our lives. All of these variables contribute to successful implementation of recycling and effective management of resources on a societal level.

In this podcast, we take you back to the Bronze Age, to a site called Anyang in Henan province, slightly to the east of central China. Anyang was the last capital of the Shang dynasty, over three thousand years ago. The Shang dynasty ruled over the middle and lower Yellow River valley from around the 1600BC to 1046 BC, when they were pushed out by the next dynasty, the Zhou.

Excavations by local archaeologists at Anyang have made incredible discoveries: There are massive ceremonial monuments, huge settlement areas with metal foundries, the tombs of kings, queens and other elites, as well as more ordinary people, and amongst all these buildings, there is a large number of amazing artefacts such as artefacts of bronzes, jades, stones and detailed ceramics. As well as all this material richness, Anyang is very notable because of the discovery of another artefact- the oracle bones. These are ox-scapula or turtle shells, inscribed with the earliest surviving example of writing in Chinese history, with the glyphs on them relating directly to modern Chinese. There were not only used for not only recording but also divination – if you want to hear more about that, list to our podcast by Professor Chris Gosden on the 'History of Magic'.

The objects that we are concerned with today though, are the bronze objects. Excavators were amazed by the pure number of such objects at this site. While archaeologists often use the word 'bronze', such as the 'Bronze' Age, we should take a moment to talk about what we actually mean. A modern metal is defined as a 'bronze', it is an alloy of copper, containing approximately 10-12% tin, and the term 'brass' is used for alloys of copper and zinc. There is a complicated history in archaeology of using these terms, often 'bronze' was used for 'art' objects and 'brass' for utilitarian or 'tools', with little to no care as to what the actual composition of these metals were. As such, the term 'bronze' in this talk, and in much archaeological work, simply means a 'copper alloy'. At Anyang, those bronzes

made by copper, tin and lead, and it is these objects, and in fact their chemistry, which allows us to look at recycling in Bronze Age China.

Whilst lithic, 'stone', objects can be recycled by physical changes – they can be re-knapped, re-broken and sharpened – it was only until the discovery of metallurgy that our ancestors realized that, through repeating the high-temperature process, we could transform the metal we have made in a completely free way. That is, we can completely remove all visually observable traces of the previous object it had been.

In the original production of bronze in China, tin and lead were added to copper to aid the casting process. These additions can significantly reduce the melting temperature of copper which creates a which can flow further before it cools and sets – This means that leaded copper alloys can be used in highly complex moulds, with lots of detail. The typology, or object types, of the bronzes at Anyang consists not only of weapons, tools and ornaments but, very significantly for China, bronze ritual vessels. These vessels are unique to central China, with no parallels found anywhere else across the entirety of Bronze Age Eurasia, from Siberia to Spain.

Because of the long history of these vessels in China, and the contexts in which they are found, we know a great deal about these ritual vessels. They were used in sets, held different kinds of food, and were used in various ceremonies to worship and contact the ancestors. Ritual performance was one of the key characteristics of the society that evolved in Bronze Age China and these bronze ritual vessels were a part of such rituals and they therefore provide crucial material evidence for archaeologists to understand the underlying ideology.

The majority of these bronze ritual vessels entered into the archaeological record by deliberate deposition – that is, they were deliberately sealed away or buried. For instance, in the tomb of Fuhao, archaeologists manage to dig out around 1.6 tons of bronzes. Because of the oracle bones, we actually know a lot about Fuhao – she was the consort of the King Wuding and a prominent military leader in the Shang dynasty. It should be noted that many tombs were robbed, and it is likely that other tombs held even more.

Most of the 1.6 tons of Fuhao's bronze is in the form of these ritual vessels, with her name cast as an inscription into the design. Both this weight, and the clear indication that these were deliberately made for Fuhao alone, gives us a vivid illustration of the massive scale on which metal was produced in early dynastic China.

What is equally impressive is the standardized manufacturing technology. The foundry masters were extremely good at controlling the addition of tin or lead to copper while casting. Scientific analysis shows that her ritual vessels or weapons all contain around 10-15% tin with lead less than 5%. Such a precisely controlled alloying recipe results in optimal mechanical properties, consistent colour, as well as the ability hold fine detail.

This is by no means unique to Fuhao's objects. Bronze objects excavated from other top-elite tombs also illustrate a similar pattern. However, and this is the point where the story starts to get complicated, when the metal from the tombs of the lower-elites were analysed, a completely different picture begins to appear.

These tombs had been classified as low-elite because each tomb contained far less in the way of objects, indicating poor individual wealth, and less evidence of ritual. They contain much less in the way of bronze, jade and ceramic objects, and those that were present were in poor quality in terms of finish and detail. Unlike the high-elites, none of these lower-elites were buried with human or animal sacrifice – Fuhao herself had 16 humans and 6 dogs sacrificed in her tomb.

When we look at the chemistry of the copper alloys in these low elite tombs, it is apparent that the addition of tin and lead was much less controlled. While it is incredibly variable, ranging from zero to 20% tin, the majority of low-elite bronzes contain either tin or lead less than 5%.

The sharp contrast in the alloying pattern gives us an important information in how these low-elite vs high-elite metals were produced, and in fact can give us clues to decode the choice of recycling. In this case of Anyang, it is clear that what metal you have access to is incredibly dependent on your position with the social hierarchy. Top-elites such as Fuhao could undoubtedly have good access to abundant supplies of precious metal. Her objects were therefore made with carefully weighted copper, tin and lead in order to achieve the best quality. The lower elites, however, made do with what they could get.

The rather random alloying composition in the low-elite objects is open to various interpretations. Some of the good-quality objects could be gifts, rewards for loyalty, from top-elite class. However, those which require more consideration is those containing tin or lead less than five percent. We can up with two potential hypotheses: that these could be either from mixing and recycling of old broken objects, or deliberately made with less expensive tin or lead.

The impurity patterns within the bulk copper shed more light on this issue. Chemical analysis suggests that the copper used for Fuhao's objects is much 'cleaner' than others. There is a large suite of elements which are normally associated with copper ores in nature, which can be removed before casting, probably through the process of refining. These include arsenic, antimony, silver, nickel, zinc and iron. This refining is another production step, which is not necessary but improves the quality of the metal.

These elements remain present in noticeable amounts in many of the low-elite objects, but not as high as in some contemporary objects from other sites. Again, this suggests that the raw metal to produce the top-elite objects at Anyang was extremely well-selected and the manufacture process was highly standardized. However, the completely different pattern in the low-elite assemblage suggests that much less organization was imposed to their production and circulation. It seems that some of this refined material is mixed with less refined, less controlled material. That is, the high-elites have fresh material, the low-elites are more reliant on recycling.

One can probably draw at least two implications from this contrast. Firstly, given the formidable consumption of metal at Anyang, recycling was probably necessary. It was employed effectively to ensure that people of various social classes had access to bronze objects, even though low elites probably only had limited access, dependent on recycling and the benefices of the high-elites. This reinforced the power and control of these high-elites. Similarly, the fact that more groups could obtain these bronzes, particularly ritual vessels, created and reinforced the ritual belief and practices which were part of the critical foundation for the society as a whole, and likely helped maintain power and social cohesion.

Secondly, identification of the objects which were likely not made by recycling is also of vital archaeological significance. We start to appreciate the fundamental value system of bronzes in ancient China. Archaeologists are often concerned with geochemical provenance, looking for a chemical fingerprint within metal objects which might indicate where the ores used to produce this metal originally came from. Since we know that they the objects recovered from the Fuhao's tomb were not recycled, they perhaps still contain such vital fingerprints. As Anyang is located one of the metal-poor regions in China, it is crucial for archaeologists to understand Shang China where the metal came from. If this can be unpicked, we will be able to better reconstruct the both contemporary trade and exchange, or any further interregional communication or control.

If there is one lesson about recycling that we should take home from Anyang today, I would say recycling is essentially a collective social choice. It undoubtedly has economic concerns, both in the

past and today, but it is also deeply embedded with many other aspects of our society. Nowadays, because of the increasing concern of climate change and sustainability, the slogan of recycling has been everywhere. But we have to realize that recycling needs the right social, cultural and political ecology to grow up, to mature and to institutionalize. The increasing social capital of recycling is promising, but if doing so causes recycled or reusable products to become so expensive that the majority of the population cannot use them, we will have the opposite of the situation at Anyang, to our detriment. Ultimately, recycling is a choice made by a human society, not a consequence of any natural process, and it requires social pressure and desire to maintain.

Thank you for listening to Digging for Meaning. For more information about this topic, or for any of our other episodes, please go to our website at arch.ox.ac.uk/podcasts.