

EAC12 Q&A Session 7

2021 March: 12th Experimental Archaeology Conference #EAC12, World Tour

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So hello everybody and welcome to the live Q&A session of Session 7. This is day 2 of the EXARC conference, 2021. We have our speakers here all anxiously awaiting your questions and I see there's a lovely amount already.

We have our first question for Peter here.

At the open-air museum, how much interaction do you allow your visitors to have with the houses? For example, can children climb on the houses? Can people go in them and on them et cetera, how much interaction is allowed?

That's a great question. The house structures were built just before lockdown, so the answer is to some degree, we're not quite sure. They're built as part of a research project, so at the moment we have them relatively separate from ... they're within a fenced enclosure. But I think in the longer term, it would be really nice to have sort of structures at the site, which would allow people to really engage with. It's a site which is just part of the university's botanical garden. So it's accessed by quite a large number of public visitors. And over the time I've spent there over the last few weeks, you see quite a lot of people sort of having a little look around and nose in, into the structures. The hut is currently quite well occupied by mice. So that usually puts off most visitors at the moment, but yeah, I think it'd be great to have more interaction.

Okay. Great. Thank you. I actually have another question for you, asking: **What is your henge based on, did the builders also receive any inspiration while building it of what the purpose might have been of the original?**

That's a great question. Now You think I would know the answer to that? As I understand it was built in 2008. There is some information about it online. It was built by a former student of Liverpool university, whose name is John [Hill], but I've forgotten his second name. There is more information about it online. There's actually a really nice post, which is a really nice sort of discussion of it, of the henge itself and a sort of visit to it in space. So it's really nice to see people exploring it as a monument. It's a one-third replica of the size, so it's not quite full-sized, but it's a really interesting layout and it's aligned on a number of features within the landscape, as well as the astronomical alignments that were sort of being explored by the experimental research.

Thank you. That was a good answer. I have a question here for Sally.

What kind of leather is the original Clonbrin shield made from?

As far as I know, they're not quite sure what the original Clonbrin shields were made of because it's spent so long in the peat bog, being able to tell exactly what it is, is quite difficult. But I can certainly double check on the sort of original documents. So if the person who's posted that would like to contact me, I can have a look in my research stuff and have a chat with them later.

Perfect. That sounds good. Actually we have another question for you about the shield.

Would it be possible to heat the leather in place, on the mould, rather than preheating it?

So the material I'm using is not leather. It's not being tanned at all. What I do is I take the green cow's skin, so that's a fresh cow's skin, take the hair off of it, take the fat off of the inside. And then I stretch that piece of skin and heat that over the fire. And then I put it in the mould, I think to heat it on the

mould, you effectively could do it if you blow torched it, sort of thing, but then you have the chance obviously of burning the skin. I'm using the radiated heat, generated from the hot stones, rather than a flame to heat the skin. Does that answer the question?

I think so. **I suppose they were wondering whether you could skip the middle steps, so to speak. So rather than stretching it out and then applying it, just having it on there and shrinking it in place.**

Oh yes. I see what you mean. So the piece of skin is put into the mould outside of the skin, the grain side down. And that's how you create the shape. To heat it you'd have to hold the whole lot upside down effectively over the fire, which would make it really, really difficult because you'd have no way of holding the skin over the heat, if you see what I mean. So I don't think that would be very easy at all.

So our next question is for [Nicola](#).

You focused on the casting aspect of your research in the video, but maybe you could give a little taster of the second part of your experiments looking at silvering technologies. And also, are you planning any further experiments with minting?

Okay. The silvering technology was actually the main bulk of my experiments and the main purpose of the thesis, but I couldn't include them in the talk because it was just too much information. We'll be releasing a publication about the silvering experiments later this year, so keep an eye out for that. But basically in the period I'm looking at, the Roman moneyers were artificially enhancing the coins by a process of [...] enrichment, and we know this process quite well and how it works, but at the later end of the period, so about AD270 there was no longer enough silver in the blanks to create the [silvered] surface created by enrichment. So they had to change and create a new silvering technology. But we don't actually know, we didn't know before, what that was. So my experiments tested a number of different methods that have been suggested for ancient silvering and actually found that they were directly enriching the surfaces of the coins by adding silver, tin and lead to the alloy and then heating up and that would force the silver and lead to the surface. And then it would plate the coins from the inside.

Perfect, thank you. I have another question for you actually:

About the powdered charcoal and the fact that it didn't work as well as you were hoping. So what was your original reasoning for using the powdered charcoal?

Just from previous literature and then speaking to people in the department, it was just suggested that would be a good way to go. Obviously thinking about it, the consistency was just not right. So after reflection, switching [...] and that just had spreadability, really, it could [cook] the moulds properly, really made a huge difference.

Okay, perfect. Thank you. We have another question here for [Karina](#) / [Jannica](#). Thank you for your talk, interested in many details which may be in the paper. **You prepared a hundred kilos of ore, but only added seven kilos to the smelt. In my experience, this only just starts to establish a working slack bowl system. Why did you decide for such a small amount?**

We wanted to.., we did only one run with the furnace and then we had only used seven kilos in total, so we are planning for more experiments.

Matilda: Okay, makes sense. Pre-collect all the material, save it for a rainy day. Yes.

In the beginning we didn't know how much it would lose weight before the roasting. So that's why we took up so much ore from the sea bottom.

Okay. **Do you think that this might've been something that happened in the past as well? Or do you think that people would have known how much to use, so would only have collected what they needed?**

Oh, that's difficult to say. During excavations we found two furnaces and they have been used multiple times and we found also ores next to the furnaces, different kinds of ores. Lake ores, ores from mires. So maybe they have mixed different ores to get a composition that is suited for the iron they wanted to produce. We don't know yet. We are still doing analysis of the material.

Our next question is for [Elizabeth](#).

How much contamination is on the objects, for example, from museum conservation, et cetera. And how does this affect identification of what elements are present in the raw material?

In terms of contamination, it's more that they've stripped away a lot of the corrosion from some conservation. So they've removed the green stuff and the mirror's gone shiny again, which unfortunately... that actually removes the original surface of the mirror. So then the metal that I actually analyze is the bulk metal. It's like in the middle of the mirror, essentially, which can be an issue because there was possible surface enrichment where the surface of the mirror would have been a different composition and then a different color to the actual bulk metal I'm analyzing.

That's interesting. Out of curiosity:

Are you planning to do as well experiments in terms of replicating the mirrors as well?

Yes. So the methodology was from my Masters and I've just started my PhD and that is a big part of my PhD and trying to recreate a number of arsenical coppers, looking at the different micro-structures and how they were manufactured.

Next question is for [Stacey](#).

If they had to give up their wings before entering the camp, how do you think they made the moulds if they didn't have, I guess the original [to press in]?

Yeah. So in some cases that was definitely people carving them. So I didn't have room to include all the different wings I looked at in the presentation, but I do have examples of some that were made from wood. So we have wooden wings there, which could then be used to create the master copy. There was also a possibility they could have carved soap or they could have used beeswax, which some of them had access to. If they were using a lost wax method. There were also people that did retain their wings. So not everybody got rid of them, but quite a few people had to for the various reasons discussed.

Thank you. So that also might be a future thing.

Also trying some wood carving or will you stick with using existing wings?

Oh, definitely. I'd like to look into different options. I did attempt to do some soap carving, but sadly didn't get very far with that. So I think that's something that I'd like to look into further and explore a bit more.

A question for [Jake](#) here. **You talked about the need to look at these moulds as separate objects in their own right. Do you think that they would have been made by the same people minting the coins or in the same context or as part of a completely separate process?**

So that's actually a really interesting question and you know, discussions around this material, are starting to kind of encroach on that topic because when you're, when you see an artefact like a pellet mould, and if they're making pellets you know, that doesn't necessarily mean that the entire, if it is for coinage, that entire process is happening on that one site. And we do have assemblages of coin

mould that are found on sites where you don't, typically, it's a small site and it doesn't have any other indicators that it might be a mint, you know, in, in the past, sometimes just the presence of this material, these pellet moulds is used as the identifier of that site being a mint, which might not necessarily be correct. So there's actually a lot to take apart in that, you know, if you consider the entire process from the raw material, all the way to the finished product, there's so many individual processes and, you know, that the material goes through, you know, and not all of that happens in one place. It doesn't have to happen in one place. It's all about the bigger network that it plays a part in.

That sounds good. This actually relates a little bit to another question that is aimed at Nicola, but you might both want to say something about this. Cause you mentioned the minting machinery was moveable. **So could this have meant that there was not a central location for minting, but that there would have been traveling minters? Sort of like traveling carpenters or...**

Obviously, they had the mints in the cities that were not temporary structures. However a lot of the Roman silver went to the army, so to keep them happy, they had to have the coins movable structures that they could take with the army so they could pay them. So the movable structures, everything should be able to be created. You know, as they are traveling around. Does that answer the question?

No, definitely. I don't know. Jake, if **you have anything to add?**

Yeah. I think, you know, the same concept of like mobile minting as it were, has been thrown around in the late Iron Age period as well. And I think it's more of a question that's probably best suited to... some are more familiar with maybe the iconography of the coin edges, you know, numismatist because you might, you can track the art styles across different issues. And you could maybe look at that in terms of mobile minting, maybe the person that creates those designs is moving, as part of, or transferring from site to site. It's not necessarily something that I could look closely with the material I focused on, but it definitely is a concept and a pathway that should be looked into further if you want to kind of produce this big picture of what coin minting really looked like.

Matilda: Thanks. And like you say, I guess it's interesting that certain artefacts are considered diagnostics of certain site types, but actually that might not be the case at all in this case.

We have a question here for Peter. **What is generally the background of your students as you offer so many scientific and analysis opportunities. Do you have more students coming from scientifically focused backgrounds than archaeological backgrounds?**

That's a good question. I don't get the impression that that's the case. And from my perspective, it's much more important for archaeologists to be kind of engaged in scientific methods and scientific research and understand the way in which that can really benefit their own research to answer archaeological questions, then be to really kind of, sort of proficient scientists from the beginning I think, I think that's something which comes with experience. So I think that a lot of our students have come from a very wide range of different backgrounds. Some have more interest in science than others, but a lot of students will pick up an interest in science during the course of their studies. I hope they will.

We have another question here for Corina /Yanika.

If the local clay was not good enough for building the furnace, where do you think they would have got the clay from? Because it's interesting that they use local or would have maybe imported clay? Do you think another material or method of smelting might be possible?

Well, we did a survey of the clay and the local surroundings. And we found clay approximately 15 kilometers away that was suited for the smelting and that had enough refractory qualities, could

withstand the high temperatures. But we couldn't collect that clay and bring it to the experiment, so we had to use modern clay. So there are suitable clays, but they are approximately 15 kilometers away. So it seems like they have located the iron production close to the iron ores and they had gone a further bit to collect the clay. So, the most important seems to be a closeness to the local ores.

I see that there is a question for [Stacey](#).

Is this kind of metalworking amongst prisoners of war something that is common across the prisoner of war experience in different armed forces in World War II?

This is a really interesting question. So in my initial grouping the majority of them were wings. However, I did have one insignia, which was the long range desert group. They had done a direct copy of an insignia, however they'd briefed on it a little bit, so that one was more possibly carved from memory. There's also some writing about people creating on bars out of tin. However, I would hypothesize that maybe because if someone just found some little strips of tin in the ground at one of the sites, they probably wouldn't necessarily connect that that might be something to do with insignia. It's something I'd like to look into more, but I haven't found a huge amount of evidence around that yet.

I actually have another question for you here.

Is it possible to look at the wings and link them directly to an individual? So to think how they might be using the unique skills that they have to produce effectively the same object. So a person whose hobby is woodcarving chooses wood and so forth.

So some of the people actually wrote the names on the back of the wings, which has been particularly helpful when trying to trace them. However, it still doesn't quite tell me who was actually making them. I have a few accounts, as I talked about in the video where it's people discussing that they were making them. And I think it'd be really interesting to try and trace back a little bit more, see if I can find exactly who was doing it and see if I could find out a bit more about that background as well.

Great. Thank you. We have a question for [Lara](#).

If things were to proceed ideally in your perspective, how might an individual conduct experimental archaeology ethically, especially in countries or contexts where there are ethical dilemmas and how might an organization do so?

Well, thank you for this wonderful question and thank you to all the organizers of the conference, by the way. And sorry, if I take advantage of this moment that I'm speaking, I would like to remember John Coles before going on with the question. And it is a very interesting question. It is crucial that every ethical dilemma that we meet, not only in experimental archaeology, you know, that's the real point of my presentation, but in how we conduct both our research, and our, for example, behavior with our coworkers and how we approach our communication to the public, it's like an overarching issue. So the most important thing would be to start from ourselves, you know, develop some sort of reflexivity and understand that the healthy part of our relationship is basically meeting halfway with the other. So whatever it is, the other is a major ethical issue like that. I don't know, it involves, for example, parts of society who are struggling with it or a plant or an animal, you know, or other things, or our peers. We really need to ask the ethical question first. I hope that I kind of replied.

That sounds like a good one. We have another related question, actually.

What advice would you give to those experimental archaeologists who are not affiliated with an institution? In terms of how to proceed ethically, who might not have the structure in place, shall we say.

Well, I would actually... everything is listed in the description of the video. So we would suggest to start with the Singapore statement. This is why I chose this initial. That's just the beginning, you know, of all the issues there are there, but that's a good start. I mean, if all the scholars have agreed on those principles and responsibilities I don't see why someone else who's not into an institution should not use them.

Okay, good point. So yes, if anyone wants to check on that, all of the links were underneath the video, which can be found in the Session 7 playlist on YouTube, on the EXARC YouTube channel. So do go and check that out.

We have a question for [Jake](#).

Do you think that people in the past would also have been noting the temperatures and the weights with such precision? Or for example, as you continued with experiments, did you recognize more qualitative ways to measure the different steps in the manufacturing process?

I guess it's all about your skill and perception. I think from a modern perspective it can be quite hard, with all of our technological advances and our reliance on the internet and stuff, private information, it can be quite hard sometimes to think that people who don't have access to actually learn to, their observation skills are so much greater. And if you've been working with pyro technology for many, many years, you kind of naturally develop those skills to be able to tell when something is right. When the fire needs more fuel, when it's at the temperature that you want it to be. And in terms of weight, obviously in my experiment, I used an electronic mechanical weighing system to get precise weights, but it's quite arbitrary in terms of relating back to the past and back then they could have easily had something that was of a standardized weight that they used, perhaps. And it could have been anything, a small metal cube, it could have been anything. But they could use that easily to weigh, maybe not to the same precision that we can weigh here in the future. But as I've said in the presentation the weight differences are negligible really and the weights that we focus on now wouldn't... might not have really been too much bother back then. If you look at the weights of coins across certain series there is variation in their weights, but generally it keeps to a tight group. So yeah, I think it's all about observation and skill.

On that topic. Did you ask at all for assistance or offer experience from current, modern coins minters?

Part of my research is the fact that..., part of the arguments that crop up in more recent discussions regarding that material is whether or not you can actually say that this material links explicitly to coinage. There are a lot of, from the earliest publications of this material that link was made and it's persisted. And so when you're considering it with all of the kind of analytical techniques available to us and the wealth of research that we have to delve into, to say that they're linked to coinage is a bit...without the data to back it, it can be a bit treacherous. So I'm choosing to focus specifically on this material and reconstruct the alloys from them before I start linking it to coinages. So as to answer the question, I at the moment I'm veering, staying away from coinage slightly just to get the groundwork done on these actual artefacts, so that then they have a strong foundation with which we can start to link beginning to certain artefact series.

Thanks. I actually, while you're still here, I have a quick follow up question to an earlier point you made. **Metals were granulated first separately, then melted to pellets in the moulds?**

Yes. So there are I do know that in other experiments that have been done alloys may have been, you know, the metals may have been pre-alloyed before being granulated up. It's definitely something that needs a lot more research and consideration because in terms of like what I've seen in archaeological material, when you're looking at just the minute residues, it can be really difficult to

tell whether you're looking at a residue from an alloyed metal or residues from the separate components. And that's why the experimental data is so important, because it can help us build models to kind of pick those residues apart and reconstruct them properly.

Thank you. And while we're on the subject of minting, I have another question for [Nicola](#).

The clay moulds were impractical and the bronze can be recycled, but what might account for the lack of the limestone moulds in the archaeological record? And then there's a second part. Were there any coins with surface depletion that you looked at and have you experimented using acid on the coins?

Whichever moulds that were used in the secrecy exercised at the Roman mints to ensure that moulds and all the materials didn't fall into the hands of counterfeiters means they would have destroyed whatever material to prevent it from being reused. So even with limestone, I guess they would have broken it down and destroyed it. But like I said, none have been found in the archaeological record. and then what was the second half of that question?

The second was: **Were there any coins with surface depletion that you looked at and have you experimented using acid on coins?**

Okay. Yeah, so, like I said, one of the main aspects of my experimental work was the... looking at the silvering techniques. And we know that in the period I looked at, surface depletion was the main manner that they enriched the surfaces of their coins up to around... it was around AD 261 there was not enough silver in the alloy composition to create a silvered surface through to depletion of silver. And so yeah, I created coins of all different compositions and then I tested four different recipes of acids, which again is going to be in the publication. Actually, no, if you check out Debasement volume of Kevin Butcher, there's a paper in there with the different recipes that I used. I did test different acids. I tried lemon juice, vinegar, and then also I tried plum juice as well. And then I also tried two recipes with ferric sulphate in because I had actually read in different papers that that could have been used, but all the details, again, are in that publication of Kevin Butcher.

Okay. Great. Thank you very much. I have a question for [Francesca](#), our pottery people are waking up, gradually. **So you mentioned creating the kiln floor as segments to avoid splitting and being forced to recreate the whole floor. Is this approach based on known examples? Kiln floors above the firebox like this seem to often be built in situ. So would you explore the possibility of creating it in situ in future work?**

Probably yes, well, now we try this way because there is some archeological evidence of splitting the flat platform in several parts. And also because it's more handy to do it in this way for the moment, but why not? If there will be another opportunity to build and create another kiln we may try to do this way. Yeah, thank you for the question.

I have another one for you, actually. **So what other changes would you make to this experiment if you were able to run it again? What results were most surprising for you in this present experiment?**

Well, at the moment we still have to fire the kiln actually, because we had... I mean for the COVID restrictions, we couldn't go on and fire it last year. So we, hopefully we can do it this summer with less traveling restrictions, because at the moment I am in Italy and well, so first we have to see what will happen, I mean, the results of these experiments that we are doing and what we are looking forward to... to see if the perforated floor works well. And what's the reaction of the clay that we use to make the pots in this..., during the firing and what will be the fuel consumption to fire our pots, et cetera. So we'll see.

Juan Ignacio: We would probably experiment with more sigillata formulas to improve black gloss production.

We have another question for Elizabeth. **You mentioned the quite high arsenic content. Is there any kind of evidence, ancient or indeed from later periods, for adverse effects of this level of arsenic content in metal objects?**

A number of people have looked into the properties of arsenic and how it changes copper. With high arsenic it increases the hardness of the metal, but also makes it really brittle. So when you work it, it will crack quite easily as I've experienced trying to work some of my experimental stuff, which you don't want to merit a crack. But you do want it to be quite hard for a polish cause the harder the metal, the better the polish and in turn, the better the reflection will be. So it's kind of, you need to get the balance right. And high arsenic also impacts the color of the metal. So the more arsenic, the more like silver the metal becomes. So it changes the appearance of the mirror and then how the reflection would look as well.

Okay, thank you. Out of curiosity: **Would you, because you said you were hoping to do some experiments with making them, I suppose... you wouldn't be able to use arsenic? This is a very ignorant question from me, that you wouldn't be able to use arsenic nowadays, because of course it's not considered healthy?**

We've done health and safety stuff and I'm using really small quantities at the moment. So about the size of a coin and creating blanks that size to do my experiments on and discussing it with lab technicians, we might be able to get full protection gear and go out to Ness actually, [which is] open and pour some arsenical coppers, just a lot of health and safety precautions were needed.

I don't know if anyone else has any comments on that that they want to add?

Yeah, I did some casting, I did use lead in the coins because obviously the composition shifts in AD260 to lead, but it was small quantities.

Matilda: Of course there's a lot of materials, I imagine, for a lot of experimental stuff that in the past was, you know, doesn't matter, you can pour lead on your eyeballs, but nowadays it's not really possible anymore, so it's an interesting concept to consider.

We have a question for Sally. **Was it possible to give an indication of how much shrinkage took place with the heat and was there a cue of some kind to know when to stop?**

Yeah, that's an interesting one because, you know, the sort of distinct lack of clocks or timing scenarios and that sort of thing. So there was definitely shrinkage, as you put the skin over the heat and you could watch it shrink. That's how quickly it was sort of moving from the sort of ethnographic accounts by Catlin. He talks about how the guy making the shield had his tribe with him and they sang and danced. So I would like to see if I could find some sort of discussion and research that's been done on sort of songs for that particular procedure or for other procedures to see if there's anything that might link with that. I was heating... I made four of these shields. Well, I made three shields and had one complete failed attempt. So I did it four times and I heated them from between 25 to 45 minutes. The one that failed was the 45 minute one. And the one that was the best was only heated for 25 minutes. And as for a cue to know when to stop, well, I've got one shield that's actually a bit smaller than the mould cause I didn't stop quick enough. So it was sort of about understanding that I kept a tape measure handy and I knew how big my shield was. And if it was looking like it wasn't going to fit my mould rather than I took it away from the heat then. Hope I answers the question. If not, give me an email and I can get back to you a bit more.

No, I think that's really interesting. **It's also interesting that you mentioned there's some which were left on a bit too long and got smaller. Do you notice that's in the archaeological record as well? There's a lot of variation in size?**

Well, no, cause there is only one of these particular Clonbrin shields...

Oh of course, yes...

Because there's nothing to say that there aren't other artefacts made using this heat treatment process, because indigenous Americans have... there is evidence of them heat treating green skin and then making bowls. So the, you know, it's... there could be other artefacts made using the same way. From my perspective, the one that failed I had to actually leave it soaking for longer than the other three. So I wonder whether that wasn't a contribution to why it failed as well. It looked like I overcooked it, the skin became quite brittle when I tried to put it into the mould and it sort of all cracked. So, you know, that's quite an interesting... it's... every animal's different so that every skin will therefore be different. There's so many variables really, but you could definitely watch it shrink. And then once it was not too small for the mould, I took it out of the frame and got it set up in the mould as quickly as possible.

Okay, you mentioned cracking by the way.

Yeah.

Because you said in your talk that the shield is still holding up well, but has it been used regularly since its creation? Do you think maintenance would be required if it was used more?

One of a couple of the things, one of the things I think about are...lots of sort of artefact, oh well, what we view as artefacts, but obviously would have been everyday items, would have had a place somewhere within the homestead of the people that were using them. And certainly something like my shield, if it was hung up in amongst the rafters of a roundhouse would have gradually been sort of smoked and that would have helped its general preservation to stop it being eaten by mites or mice or anything like that sort of thing. I take it out of my..., it sits, it sat in my sewing room where I work. So it's sort of in the house in a dry environment, I take it out and hit it with a sword occasionally on a sort of showing students that sort of thing to have a look at it and see how it's going. And it's still incredibly flexible.

We have actually..., I noticed Peter in our chat here, our little meeting. Peter mentioned that Hephaestus, the God of blacksmithing, his lameness is a result of peripheral neuritis as a result of arsenic poisoning.

Related to that, Peter, do you have a lot of students who, for example, want to do... I mean, when you're talking about health and safety, how... are there any experiments that can't be done because in the modern day it's just not possible?

I'm sure there are. So yeah, the question about Hephaestus to begin with, this is something which I don't know where I came across that, but it was published in 1999 in a medical journal. The suggestion that actually this might be a pattern. But as opposed to whether there're requests, there're experiments that can't be done, I think there probably are limits, but as far as I know, and I've only been at Liverpool university for a year now, but as far as I know, there's been some quite exciting experiences I sort of would have thought would be very difficult to find sort of ways to do safely, which have been managed very effectively within our labs. So I think there's exciting possibilities of all kinds. And it's the way in which they're done, the scale and so forth is the sort of the questions that need to be resolved first. And obviously the safety of everyone involved is going to be the most important thing, but so far we've managed to find ways to do some very exciting experiments, really, really safely. And so that's how we intend to continue.

Matilda: Thank you, that's good. I was more just, that was my own curiosity, I have to say.

I tend to be quite risk averse, so I think it's certainly an interesting thing to question, but I think from a safety point of view, we've managed to find solutions to things which I think were really surprising and really sort of positive in terms of the kinds of research that we can really undertake.

Matilda: Yeah, no. And I think there was one session yesterday where people were talking about hemp using hemp and experiments, for example, and how there's a lot of security risks around that. And so it's interesting that there's various materials that are kind of less easy to be used, shall we say, in the modern day?

Peter: I think that's definitely true. Some things require a lot more paperwork than others.

Yes. A lot more permits.

Lara. Yesterday someone had posted in the Discord server. I don't know if you saw it and asked: **Are there political oppositions that could create a hard time for EXARC's anthropology and archaeology activities in their region. I was wondering if you had any thoughts about this, do you think, for example, the Singapore statement is an adequate guiding document to help navigate people on these topics who might be in countries, for example, with stronger political opposition to their work?**

Yes, definitely. I think it's a very, very good point and that's exactly the point that I was making with the presentation because it might be possible, you know, that there are conflicts of interests, which have political reasons, you know, political agenda, has it happened already. I mean, if experimental archaeologists at the end of the 19th century were conscious as we are today, of the history of archaeology and the misuse of archaeology and the justification of power, I think maybe something different could have happened at the time. And I think that it might be possible, but again, ethical issues and research integrity and human rights of course need to be negotiated. So it would probably support a kind of more conscious and socially responsible research activity together with, for example, the promotion of democracy and just making one example of many, or applied experimental archaeology, how useful it can be to re-integrate migrating people, for example. I think it's like this.

Okay. We have a couple more questions still to finish us off. So for Carina and Jannica: **Did you include any temper ingredients with your furnace shaft clay, sand or organics? Is there evidence archaeologically for this kind of modification?**

No, we didn't include any things like sand or organic material into the clay. This was morton clay. So we were not allowed to take anything like that into the clay, because the seller, he didn't know how it would react. But Carina can answer about the prehistoric clay.

Yeah, next to the furnaces, we found a lot of fragments from the furnace walls and a ceramic analysis shows that it's coarse-grained clays that can withstand very high temperatures, but are very low in plasticity and there are no temper added to the clays. So it's natural.

Okay. Oh, that's interesting. I have another question, actually. So you used scuba divers. **I noticed also a lot of nets in the video, but also using scuba divers to collect the ore from the floor of the lake. How do you think this might've been achieved in the past by, for example, hunter-gatherers or the people who were living there at the time?**

Well, it's evident that you can find this ore on the depth of one, two, three meters or yeah, about that. So it would be possible for the people in this time to dive and get the ore without any equipment.

Okay. Great. That's one way that the modern world does help us though. It means that we can be warm while we collect in a wetsuit.

Yes, we tried to collect some ore in May, but then it was very cold. So that's why we came back in July with scuba divers and they were able to get much more than we could do from the boat.

Thank you very much. Two more questions. We have one for Stacey. Oh, it's actually a two-part question. Although I think you mentioned one part earlier, already.

Were there different styles per camp, perhaps based on the exact sort of technology or the moulds chosen, or did the styles vary within each camp?

And the second part is:

You mentioned needing more skill in future experiments, but do you think that the men who made these would have been already very skilled in this technology beforehand?

So for the first part, I do think there were actually some really interesting similarities between camps. So on the very first slide I've got that kind of slightly chunky a badge, this got the man parachuting down with PoW around him. Well, they kind of designed their own badge, and I found one of those from Stalag Luft I. And then there was another one from Stalag Luft VI. What I am assuming there is probably somebody's moved between camps that was making them. So I think it's possible that it's kind of tied more to the person. And then there were other ones which tended to bear information about the camp itself, so say Stalag Luft I, Stalag Luft IV, but I'm not a hundred percent about that one. So I think it'll be interesting to look more into that and see if I can actually trace different insignia to different men who were creating them at the time. See if there was any one that moved between specific camps at times that would tie in with that kind of creation, being linked to them and traveling between camps. In terms of the skill, I had actually hypothesized that it would have to be skilled individuals doing it. So I wanted to try and learn more about that process and how complex that was going to be by undertaking myself as someone who had no skill in it, I thought it'd be very interesting to see if it was plausible. So actually I think through doing this experimentation, I've realized that maybe they actually needed a bit less skill than I had thought. There was also people being sent information by the Red Cross, he would send books and things like that, as well as other organizations that would support the men throughout the war. So it's very possible that they were actually sent information that would help them do it as well.

That's very interesting. Okay. So our final question is to Peter, you can finish us off.

What is the status quo of experimental archaeology in the UK? Is it getting more popular? Do you think we are making progress? And what do you think the challenges are in the near future?

That's a really good question. My impression is that it's become a lot more popular over time, but it's something which, in my view at least, is something that should become really important for us to think about. It's not just experimental archaeology but that question about sitting at the interface between a sort of research and communication, the way in which we use the opportunity for people to engage directly with archaeological research, whether that's, quite whether that's sort of in the field, in that, in that sort of more traditional kind of experimental type of research, or whether it's research that's happened in a laboratory, which is then sort of being sort of brought into the, where the results have been brought to public attention. I think that those things are the things where we really have to still have to do quite a lot of work in bringing all of our research into that sort of... into that area of interface, because I think that it's, for me, that's something which I think we don't always

do as well as we could. But I mean, I think in Britain there's more and more examples of experimental centers. I mean, our own one is not by any means the first or I'm sure the last of its kind, we're just getting started really in this, in Liverpool. So this is something where we're really excited about the future for our department. And I think that we'll see a lot more of the kind, that kind of communicative research, if you like, as that sort of way of using the experimental results of our experiments to kind of share our knowledge a bit more effectively. If that makes... does that answer the question?

Yes, it sounds like an excellent concluding statement, thank you for that.