

EAC12 Q&A Session 1

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Okay, so welcome everyone to the live question and answer for the keynote speaker and for session 1. I'll start with the questions for Eline, as you were our keynote speaker. A fascinating and very significant paper, thank you.

Can you detail how the ethical issues are managed in your excellent facility? Yes, thank you very much. Yeah, it's quite a long, ... it's very strict..., it's...in Australia... the whole ethics. So the whole..., everything, the whole facility is led by the University of Technology, Sydney. And they have different partners. So AFTER has different partners and UoW is a partner of them. So all those partner organizations, they have a representative who sits in the ethics committee. So when someone wants to do a project, they have to discuss the projects within the partner organization. So first of all, it has to go through discussion there and then via the representative they are presented to the ethics committee at UTS, and then, the ethics committee sits together, and makes a decision. If there's a 'yes', you as a researcher, you come on the waiting list to get a donor, but very often, and they're very strict about it, there's a 'no. Why? Because, they, it's not like in the US. I know one [...] facility was closed in the US because of abuse. So, in Australia or in UTS, they're very strict, very respectful to the donors. They follow... it relates to all laws and policies. And for example, what we can't do is stab wounds, we can't use explosions, we can't do gunshot wounds. I had a couple of projects who were denied lots of people actually. So, and that, those are simple things. I asked to extract some teeth from donors to do a separate teeth experiment. And that was not allowed because we would, actually, cut into the donor. So, it's very strict and very respectful, but it goes through a whole long process. So yes, for Lauren.

Were you able to measure how high the light went, in the cave, through the blender program? This might help answer the question of whether the lamps were placed on the ground or being handheld, for example. Not the flame height itself, but the reach of the light was extrapolated. So in the blender scenes, the camera view is six meters away. So you can see that the light can reach quite a distance. And depending on which combination of materials is used, even when it was placed on the ground and the lamps could have been handheld for navigation. But the assumption is that they would have been placed on the grounds or in a nook, for working and viewing and the image that was placed on the cave wall, is about one and a half meters high. So you can see that light can reach quite high and that would have been increased with more lamps that you add. Okay, thank you. Linda, we have a question for you actually.

Do you see a difference in approach to experimental archaeology between those students coming from a more, shall we say, academically focused background and those from a more practically focused background? That is a really interesting question. And I think they each bring something to it. It's almost as though most people arriving have 50% of what they need and then they have to work on the other 50% the hardest. But the people who come with a lot of skill sets, some of them are just able to translate that into many other multiple craft areas, for example, simply because they're very adept, they have good hand-eye coordination, dexterity, or they have a lot of insights or they're

people who learn by doing. Some of the people who come academically, they struggle a little bit more with the doing, but on the other hand, they usually persevere and it's the insights as much as the actual achievement, in whatever it is that they're physically interested in. That is really the measure of how well they do and, and the academic people, oh boy, they know their stuff. But it's the mixture and you put them all together in the classroom and then they cross over all of those different ideas and blends, and it becomes very exciting to see happen in front of you. Okay, thank you very much. We have a question here for [Jonny](#).

What would have been the purpose for Ötzi to carry cold charcoal? Would this simply have been used to make a very small task-specific glowing fire around the tree line or to act as a reliable base for a larger fire when fuel was available? And also how much charcoal could these containers accommodate? The answer to that question comes in three parts. Yes, approximately 0.5 kilograms of charcoal. So definitely the charcoal carried would have been used for small fires. It would also have been used for creating, for making the base of a small fire, which would then be manipulated to be larger for more specific tasks and for the sort of specific tasks we look at, then it's worth comparing to Alex Pryor's talk, which I think was the one straight after mine. And the amount of charcoal. So we've already got the dimensions of the parts of the container but if you wanted it in exact kilograms you'd have to have a look at the size of the charcoal particles. If you had lots of small charcoal particles, you get more in and the mass would then go up. You'd also have to have a look at its density as well. But you're not looking at it being a, at your sole fuel, you're looking at it being the start of the fire. So you started using the iron pyrites and the flint then you get a spark to land on the *fomes fomentarius*, the horseshoe fungus. You then blow that one so that it was a glowing ember, add the charcoal to it, blow the two together, the charcoal then lights. You then extinguish the *fomes fomentarius* and you just continue to blow on the charcoal until that's glowing like a barbecue coal. And then you can add to that any tinder or fuel that you could carry with you, if indeed any was carried. And, yeah you could still cook over that charcoal in the same way as over a barbecue, yeah. Hope that answers the question. We have another question here for [Julia](#).

They're interested in finding out if the cloth with the tog insertion would make a good sleeping blanket, tog side down would trap air and keep you warm. They are weaver, so would like to make a blanket and a mattress cover in this fabric. So they're wondering if you had any insight as to this. Thank you so much. Yeah, so sleeping blankets was one of the most common suggestions that I got during the survey that I did actually. And I think it's a really, really interesting idea, especially, because the evidence that we have of people wearing them is for - the little evidence that we do have - it's just, they might've been used on maybe long journeys, a long boat journeys and things. At which point you could think that people might definitely be using them as more than just clothing, that they might be using them as bedding in the nighttime. So I think, yeah, that's definitely a really, really interesting idea. And I know I would certainly love to make a full-size one and try it out and see how that would work. And with regards to the pile trapping air, if you wore it, tog side down, I think there's... so I did actually try out some of the different... and during my installation experiments, I tried it with a pile facing inwards and the pile facing outwards, I guess that's not quite directly translating into using it flat because that was using it where it was actually enclosing the thermometer. So it was a slightly different situation, but, I, there was definitely some difference in the insulation results that you got with the pile facing inwards and facing outwards, I think with a thicker pile, it tended to be better for insulation when the pile was facing inward, so maybe towards the body, I guess if you were using it as a blanket. So yeah, I think there would be definitely, you might

notice the difference if you're using it in different ways. So I think that's something that would be really, really interesting to try out in the future. And the other thing that I noticed with that was that, when the samples were wet, they actually insulated better when the pile was facing outwards, which I thought was really interesting because with the pile facing outwards, it also makes the water runoff it better. So I thought that was a really interesting dimension. so I was really glad that I did try it with different ways of wearing it and different ways of using it. So, yeah, I would love to make a full size one or several full size ones and try them out in different ways. So I'd love to hear how they get on, if you do end up doing that. So thank you. Could I just jump in there for a second, please. This is Tom Vosmer. Yeah. Julia, that was a really interesting talk and it reminded me of something I read decades ago. And Tim Severin's book about..., well, it's called the Brendan Voyage about his trip in a leather boat across the Atlantic - talk about experimental archaeology! But he said they had a man from [Tronto Petterson], from the Faroe islands on board with deep Viking heritage, obviously. And he said that, they should soak their woolen gloves in sea water because the insulation was better then, and I thought, wow, that's counter-intuitive. But it harks back to what you just said about wet pile, et cetera. And, I just saw, I'll have to look up that reference again, because I might be wrong about it, but it's that's what I recall. It was very fascinating. Anyway, thank you for your talk. Yeah. Thank you. Can I respond to that, is that right? Please do. Yes. Thank you. Yeah, that's that's really, really interesting. Thank you. Yeah. So one of the things that I'd really like to explore in the future is, it's about the ways in which the pile gets wet if that makes sense, because obviously the difference between what I did in the project a lot, which was soaking the pile, the samples in a bucket of water, and then trying them out. But that's not necessarily going to produce the same results as if it was being sort of slowly soaked over a period of time, maybe if you were standing in a boat or something. So I think, yeah that's really, really interesting. And I'd be really interested to see how that, the sort of different ways of applying water would affect the insulation and the sort of functionality of them over time. So that's really interesting, thank you. We actually have a follow-up question to that. I'm not sure if you did just answer this but, from someone else:

I'm presently collecting the outer [guard], the tog hairs from Icelandic fleeces. For your fabric did you use the undercoat for the fabric or was it blended? Yeah, thank you. So I, so I used commercial Icelandic yarn, so for the main fabric. So I believe that is blended. I think it feels blended to me. It feels like, I don't think it would be fine enough to be just the undercoat. I haven't looked as much as I would like to into the fibre composition of the textiles from the period and in particular the Heynes fragments, which I believe haven't been analyzed since the 1960s. So it would be really interesting to look at those and, see what kind of, yeah, what parts of the fleece those were made of, because that's a really interesting., there's some really interesting possibilities there surrounding, whether the outer coat would be used for the pile and then the undercoat would be used for the fabric, that's a really, really interesting idea because obviously it changes our ideas of how those materials were using the resources that people had and how these might represent, you know, that kind of use of resources. So I think that's a really interesting thing to explore, but unfortunately for this project, I did just use commercial Icelandic yarn, which I believe was blended. So I hope that answers the question. Great. Thank you very much. I see Eline has just asked a question. I don't know if you want to ask it yourself, Eline. Yes, I can, hi Tom (Vosmer). Thanks. It was a very impressive experiment that you did there. And so many people involved.

So I wanted to know was the boat plank at Wadi Gawasi the only part preserved of the whole boat? And then maybe, I don't know much about boats I'm afraid. **Are there a lot of ancient Egyptian**

boats that you recover in that part of the world in archaeology? No, in Egypt there are, yeah, there are a number of ancient boats recorded, quite a lot, actually, so I hope that answers the last question you had. At Wadi Gawasi there were lots of planks, there was a rudder, or quarter rudder, yeah. The other information came from mainly other excavations of similar types of boats or similar construction, generally frameless boats with just heavy planking and through-beams to hold them together, that's about it. Okay. Thank you. Does that answer your question? Yes, it does. Thanks. Thank you, Tom. Okay, we have another question here for [Alexander](#).

You mentioned doing your experiments in less than ideal conditions. Is this something that is regularly done in other experiments of this kind? Or would you say this is a relatively novel approach? I guess the ones that look... the experiments that I'm aware of have done things like made sure that all their fuel that they were using was very dry, the ambient conditions tend to have been during the summertime, in nice ambient weather and so on. As it was, we actually had a pretty nice day for it, which was purely by luck. The nighttime temperatures didn't fall as low as we thought they might do. The humidity did go to a... pretty much a hundred percent and all our fuel was wet. So we did have to adjust our fire management strategies for that reason. But it was just something that we wanted to build into the experiment from a kind of [having at its centre] point. Is it trying to replicate something which is more real life-like rather than something where you've kind of given yourself a headstart as it were? And also something that we wanted to do, I suppose, Yeah, I don't have much to say on that I'm afraid. No worries. I think that answers the question. Okay, we go and have a look... we have another question here for [Eline](#).

You talked about the interest regarding living above smelly cadavers, smelly humans. You did some experiments with pigs as well. Would you say there's a marked difference between the smells of decomposing humans and the smells of decomposing animals? Or would it be similar in that respect? No, there's certainly a difference. We use pigs because in many situations there are no other options, but pigs smell worse than humans or maybe different. I think the..., but this is a subjective answer, it's not scientifically proven, but the pig smell is even more intense and it just sticks on you even more than a human smell of decomposition.

Actually just, you mentioned, of course the sort of subjectivity of smell in that respect but you mentioned that this is something you're interested in pursuing further. How will you do that in a, from a scientific perspective or are you planning to do it more from an experiential side of things? Well, we are doing it at the moment and it is with Forensic Chemistry of UTS. So they are specialized in odour analysis and they catch VOCs. That's volatile organic compounds, above the graves. And then they analyze the chemistry. So we have graves without human remains. We have graves with human remains, with mummified remains with aligned remains, gypsum remains. So, and we have a very good student at the moment, Bridget, who is doing those analyses. Okay, perfect. Look forward to hearing about them in a future conference. Hopefully. We have a couple of questions for [Lauren](#).

So, does the program that you use also take into account, for example, wind or other environmental conditions. And as a follow up to this, did you use any examples of different combinations of candle wicks? So with multiple candles. No. So in blender, because it's open source and free to use, there wasn't an option to factor in the physics of wind and different environmental conditions. But that's a very interesting question and something I would like to take into consideration in the future. So we were only able to program the light properties. There is another

program which I think can incorporate those aspects. I think it's called Radiance. So that could be something to look into. And can you, what was the second question please? The second one was about using multiple candles, with perhaps different wicks, for the different candles whether that was something that you could incorporate. So rather than just having a single candle, and seeing what that wick did, seeing whether wicks made of different materials all combined together, would cause a different result. Yes, I think it would cause a different result. We didn't use multiple wicks and multiple candles in one experiment, because we wanted to measure the light output from just one. But the assumption is that multiple candles would have been placed around in a scene and that would, of course have increased the amount of light. But that is what I would like to look into as well to see, you know, what is the maximum amount of light we can get. And even if we had multiple wicks in the same lamp. That would definitely, I think that would definitely produce a much brighter result. We have some more questions for you.

Is there any evidence for a mix of pork or beef fat and would there be any merit for testing that?

Yeah, so the reason I used beef and pork was as a modern equivalent. So in the eighties, [...] did liquid analysis on some of the lumps found at Lascaux cave and found evidence from like aurochs and hogs, being used as the fat fuel. So I've used beef and pork as the nearest fat, but there could definitely be room to look at different types of fat and more than that. One more question for you.

I'd love to know which species of moss was used and if the birch polypore was treated in any way before use, rather than simply cutting it to size.

Oh, the birch polypore...no, it wasn't treated, it was just dried and then we cut it up, but the moss, I'm going to have to look into that and get back to you. Cause I can't remember. Always leave them wanting more... We have a question here for [Jonny](#).

What are the overall implications of your results would you say? So what would be the difference between carrying your own fire versus making it yourself in terms of the practical considerations of your results.

This needs to be put into context when you're dealing with Ötzi. He was being hunted as you can tell by the fact that he's got the remains of an arrow in the back of his shoulder, he was also navigating, he was above the treeline. He was a very poorly chap with a number of different ailments. He was really sort of struggling in life. He was also injured as you can tell by the defensive wounds on his hands. So, trying to carry fire and curate fire is a bit of a non-starter for him, really. It would have been a lot easier, bearing in mind that he was proficient in his fire lighting as you can tell, by having a look at his fire lighting equipment in the South Tyrol Museum of archaeology, you can have a look at the fomes fomentarius and there are microscopic traces of the iron pyrites there. So he was using it as, as a fire lighting tool. So if you can light your fire then it means you don't need to carry it. And if you, because if you need to carry it, you need to continuously - and from, from my experience - you need to continuously curate it. So you're stopping every 20, 30 meters to blow on an ember, just to keep it ticking over, it's a really slow process to move through the landscape whilst carrying fire. It's not in..., in the ideal situation, you'd be on a nice flat sort of playing field almost at sea level where there's plenty of oxygen. You start to get yourself up to altitude. And he was at 3,210 meters. There's a distinct drop off of the oxygen supply at that altitude. So that's going to make life even more difficult. When you take that context away and you start to sort of make it more of a generic and general point then you'll find that the..., that when you're transporting fire, unless you've got to go a short distance and you're going from your initial camp to your next location, which is, let's say, a kilometer away, yeah, that's doable. But you have to start, you have to start carrying all sorts of other equipment. It becomes an impractical proposition.

So we have another question here for Alex.

How was your fire initially constructed: pyramid, haphazard pile, et cetera.? And how was it primarily fed: the slow feed of long branches just thrown on top and was any wood cut, using an axe or was it just broken? So a couple of different questions for you there. Yeah. Thank you. So yes, where possible sticks were broken by hand. Everything was done by hand. So we didn't use any tools of any kind to break wood. So we only collected stuff, which we could move around by hand and things that couldn't be broken. We then fed them into the fire slowly over a period of time. And that meant it was quite difficult. I couldn't develop a method for accurately measuring the fuel consumption per hour across the 24 hour period, because exactly this factor of feeding the logs in slowly over a period of time, I mean, that's a fire management strategy, which I'm sure...it's just one of those things that you do when you, when you light a fire, it's just difficult to measure. Other than that, in terms of the design of the fire, it changed across the 24 hour window, on firstly, just an ad hoc basis, and secondly, according to any of the specific activities that we wanted to conduct, so, when we were heating up...when we were warming the rocks, originally the rocks were just located around the outside edge of the fire and were then slowly moved in towards the center. And then the fire kind of expanded to mound up around the box. And at that point it became a true pile. Other than that, it was just mostly..., no specific fire arrangement strategy was in mind, I suppose, is the answer to that question. The only other specific thing that we did was create embers to cook on, and that just evolved clearing the larger bits of wood away so the embers were exposed to so that we had that heat then. Julia, we've had some more questions coming through for you as well.

Did you, I imagine not if you were using commercial yarn, but did you leave the lanolin in the tog? She, this speaker suggests, when you continue your investigation, will you try hand pinning your fiber? So in the grease, not the lanolin, not washed out, for the ground cloth fabric. This should greatly up your water resistance, as commercial yarn will have been washed to remove lanolin as well as any dirt and they suggest maybe contacting a spinning guild, to help with hand spinning, for example. I think as well, if this person is a member of EXARC, I'm sure you're aware also, Julia, of the textile chats that we have. So perhaps you might be able to find someone there, but if you want to maybe just comment on that. I left the lanolin in the pile. So the loose fleece tog, which I used for the pile, still had the lanolin in it because I was a bit wary of washing it too much before I wove it in because I was worried about felting it. So that did have some lanolin left in it. And then yes, as you say, the ground fabric, because it was a commercial yarn, had been washed, and scoured extensively, so that wouldn't have had any lanolin in it at all. So it's definitely something that I would really like to try out in the future is to compare the effect of the lanolin. So to have, maybe some samples that had lanolin in both the fabric and the pile, and then some samples that didn't have any lanolin in either of them and absolutely, spinning the thread for the ground fabric would be a really good way of doing that. It's something that I would love to do, I mean, I do spin, and I would really like to do it. I just didn't have the time to do that for this project, but I do have a whole heap of...the undercoat that I actually combed out of the pile for this project, so I would love to use that in the future for that [...] it does still have all the lanolin in it. So yeah, lovely and greasy, should be great for that and absolutely that will have an effect, I think, on the water resistant qualities. What effect it would have on the insulation properties I don't know. And also I think that would affect the sensory properties and what it feels like to use and to wear and what it smells like as well. I think that will affect that. So it would be really interesting to use that in those practical experiments, but also in those kinds of sensory experiments and exploring this, the materiality of it and how people respond to that because, yeah, I think that would be a really interesting dimension to explore as well. Yeah, I think, does that answer

that question? I've, I've slightly lost track of which questions I've answered... I think so. I think it sounds good. These are also I think, follow up questions from the earlier ones as well. We also have another question for you while you're still on. You mentioned, speed.

So for the pile insertion, you mentioned speed, but did you find the looser pile easier to weave in than the more dense pile insertion? Right. So that's a really good question because I had some really interesting experiences with that. So one of the differences between the way that I inserted the pile from the denser one and the looser one, was that the denser one, I was actually inserting it in a much more regular pattern because of the density that I was aiming for. So I was actually skipping a particular number of threads between each pile, each pile lock that I was inserting. Whereas the looser one, I was actually spreading them out a bit more, but they were... also had to be slightly staggered to try..., so they didn't all end up sort of clumped in the same place, just because of the size of the sample that I was working with and the...how spread apart they needed to be. So I assumed going into it that the looser pile would be a lot quicker, but actually I found that the amount of time that I spent trying to work out where to stagger the locks actually took quite a lot of time and actually made it more time-consuming than a denser one, which obviously I spent more time just individually physically putting them in, but I didn't have to spend lots of time thinking about where I was going to put them. So, actually I found the denser pile easier than the less dense pile, because obviously that was that extra variable. So I think if I was going to do it with a bigger sample, I would have a lot more room to make it more consistent between the samples, so I get a better idea of whether putting more pile in would actually take more time if all those things were consistent. Does that answer the question? I think... Hopefully, I'm sure they'll say if not, they seem very keen... Yes, do get back to me. I actually had a, it was related to something that Julia mentioned in her talk, but I would like to ask a question of [Linda](#) because Julia mentioned indeed that some of the results seem obvious, but had never been considered in sort of more academic literature or in academic context, shall we say.

Do you think this is something that should be focused on more in the future in experimental archaeology? So these kinds of general assumptions or common knowledge, that haven't been, shall we say experimentally proven, is this something you're maybe planning to look into further or you think should be looked into further? That is such a generally applicable question. And one of the things that's really struck me about all of the conference abstracts I've seen and certainly about every single person in this session, is that they're doing exactly that: they're challenging some of our preconceptions, assumptions. And I think, you know, Julia with some quite well-known to the textile and the Viking world set of pile fabrics is doing that. And I think too Jonny with Ötzi, I mean Ötzi is seen as a well-known set of archaeological finds world famous, and yet there's still something new that you can show about how we just don't understand everything, even when we think we do. And we've made assumptions. And, and so I think everybody here is doing a grand job, and I think the conference as a whole and experimental archaeology as a whole, everybody tackles these huge sets of assumptions. Unless you do the experiment, you're just really opening up all of those other questions and insights in realizing, Yeah, we haven't really sorted out this one. And so it just goes off like a kind of beautiful firework into the atmosphere, just echoing down and there'll be people listening who will think, oh yeah, I could tackle this now. And that's just a fantastic way of seeing this whole subject. Thank you very much. Those are very nice words for a conference like this as well. We have another question here for [Alex](#) and perhaps for [Jonny](#).

I'm interested in the amount of smoke that is produced from fires. If you're making fires indoors, is there a way you would ideally make your fire, to avoid smoking yourself out? If either of you would like to answer this or both of you...The only thing I would say is you want to keep it hot, really. If it cools down then it smokes a lot, but Jonny may have more to say on this than me. Yeah, maybe, thanks Alex. There are certain things I would do. First of all, I would remove any bark. If you think about what smoke is, it's the unburnt bits really, which have become put into sort of aerosol form. So, remove the bark, get the driest wood possible. As Alex says, keep the temperature up and that increases the proportion of combusted material. If you can keep the temperature up, using large fuel, then so much the better, but actually what you might need to do is you might need to combine your fuels so that you're using small fuels as in sort of finger sized, finger width, and mix that in with the larger fuels. So that you've got that increased in temperature, but wood selection is absolutely key. The other thing, I'm not really sure what you mean by inside. If you're thinking about the inside...what I get is in my mind, is things like the inside of the Viking longhouse at the Ancient Technology Center. If you're talking about somewhere like that, then keep the drafts down as well, because as soon as you get a draft and you start to blow any smoke that you've got in a place that you don't want it. Whereas if you've got smoke going in only one place, then at least you can make good use of it. So from a practical point of view you can then start to sort of keep down [pests]. You can start to smoke food, you can do other sort of smoking activities. So, there are ways of doing it. The best ways to use charcoal, because it doesn't have those impurities. So charcoal burns almost with no smoke. Hope that answers the question in conjunction with Alex. Can I chip in here Tilly? Yes, please do. The issue with smoke is partly it's one of, do you have an effective placement of the fire and have the right kind of fuel so that it's going up and away if there is smoke. But also it's actually, it's one of those things that it has benefits, but it's also a problem. And so Ötzi is one of those people who have sort of, you know, compromised lungs, but also a lot of fires in the open-air museum reconstructed buildings, they have had issues with the fires. And so some people will only use kiln-dried wood simply because it solves some of the smoke issues, but also each one of those buildings is in itself an experiment. And in parts of, certainly Scandinavia and also I think Britain, they've done experiments in how smoke particles move around those kinds of buildings. And just the levels of, if you like, bad products from the combustion effects of the fuels and Jannie **Marie Christensen** has published an article in (the) EXARC (Journal) a while back now, five or six years ago, perhaps, which has got some very interesting insights as to how fires move smoke around, in different kinds of buildings and the effect of what might be happening to people's lungs. So I think the question of smoke is a really interesting one because it does have benefits, but it also has these issues of longer term health as well. I don't know if any of our speakers had any questions for any of the other speakers while we have a moment..putting you on the spot here. Alex? Yeah.

I have a question for Lauren. I was just really fascinated by these experiments with the fat lamps. I was just wondering, did you gather any information, even just anecdotally, about the amount of heat which is generated, because I'm thinking about this for the heating inside of dwellings, and I know that that is done in some places. And so, yeah, I just wondered if you had any comments about that based on your experiences. Oh, that's a very interesting question. Only anecdotally, but the fungi wicks definitely produced the most heat and the highest flames. Because I, you know, sat in a very dark room, doing all of these. I couldn't tell you any data about that, but the fungus definitely produced quite warm flames.

I assume that that's simply down to the rate of fat burning. If you burn more fat than it's hotter, is it, do you think it's that simple? Yeah, I think so. **The other question that I had for you was about the production. How did you produce the fat to feed the lamps?** So do you mean, how did I treat the lard, do you mean? So yes, you're just buying lard and then melted it out. I was just thinking about the amount of effort that you have to go to to produce these fats. If you're producing it on a wood fire, doing it straight from the animal because this is...I think there's a whole economy here of how you're using fats and generating these fat lamps with fuel in them which I think is really interesting to study from a fuel wood perspective and a fat perspective, and really the whole cycle. Yeah, that's really interesting. So the fats that I used were very refined, but if you were using it straight from the animal, I guess it would be quite a process to filter out some of the, you know, the larger chunks of the fat, cause that would impact the capillary action and uptake into the wick. So the fats that I used, once it was melted, were relatively smooth so that you could keep the capillary action going in the flame quite consistent, but it would definitely be more of a process to actually [strain] it straight from the animal.

Did you have any sense of how much fat that you would consume per hour of the lamps burning at all? I'm not sure, we only ran the experiment for about 20 minutes but there was still fuel left in all of the wick and fat combinations then. But the lamps from Lascaux had a capacity of around 10 to 30 milliliters. So based on, anecdotally, from those 20 minutes, I reckon they could run for a couple of hours. Interesting, that's brilliant, thank you. I see that Eline has a question. Yeah, can I just jump in here? I don't have a question. I just wanted to say that, at the University of Bordeaux, we have a PhD student who just submitted her PhD or defended her PhD. And that was about..., she did quite similar experiments to the ones from Lauren. So you might be interested to look into that. So it was about the Gravettian, and she compared torches and lamps, in Cussac cave, the cave of Cussac and then in an experimental cave. So I thought maybe Alex and Lauren might be interested in her research. her name is *Armance Jouteau*. I can give you her details if you want. Oh yes, that's very interesting, I'd love to speak to her. Okay. We actually have a question for John. It's taken so long, [John Ertl](#).

How would you see the differences between how archaeological reconstruction is handled in Japan? So looking at museums, the scientific discourse, et cetera, compared to elsewhere in the world. Well, it's a difficult question. Like, I think the one difference that we see in Japan is that there's so much reconstruction going on, that what happens is that things get built but then never get used. So you have a lot of 'build it and forget it' kind of things because there's money to build it, but there's no sort of incentive to continue to use it. So that's I think the one main difference. So when I was going throughout Europe, or mostly the UK, and looking at places whether we can [...] buildings, of course you have people using them. You have reenactors actually building them, and so forth. But in Japan, they're built by local construction firms, they're closed off [...] building, and then they appear and you never see anyone at them. So I think that's probably the main difference, is that they're built quite rapidly, quite frequently in Japan, but they're just not used in the same kind of way.

Do you think that it might be possible..., as in there might be more of an influence, especially, I don't know, hopefully after a conference like this, if everyone's listening, all people, for example, using doing experiments that involve the use of this house, we've already mentioned doing smoke, fire and smoke experiments, for example, do you think this is something that will improve? There's a few trends that are actually trying to improve that. So my database of reconstructed buildings in

Japan has 360 sites, a thousand buildings built, and of the ones that I've been to I think there's only two that have an active kind of experimental archaeology projects dealing with the buildings themselves. And so that kind of thing is starting, but it's still not mainstream. I think in terms of where it is going to begin to start happening is in the next few years as a lot of the buildings that were built during Japan's sort of bubble economy period in the 1990s, are now sort of falling apart. And so the question of, well, what do we do with them now? Do we rebuild them? And if we rebuild them, what we need, what's the point of rebuilding them for, and so I think there's a lot of these kinds of questions coming up in Japan and so there'll be a lot more experimental sort of based activities, possibly. But there's also another aspect of that, where reconstructed buildings in Japan are built by bureaucratic institutions who received money to do it and they don't get any sort of... real sort of incentive to do a kind of public outreach element to them. So it's a mixed bag of things going on in Japan. Okay, thank you very much.

We have a, by the way, we do have a comment, from someone from the EXARC community, talking about rendering lard, just referring back to the earlier conversation. They said that they didn't find it too difficult, but it's a lot of waiting and then strain. So I guess it depends how much time you have. So we have another question for Alex.

We just started coppicing our small Ash Grove this week. What effects do you think using coppiced wood would have on fuel consumption, considering it would be more consistent in terms of size, fewer branches, et cetera.? That's a really interesting question. I hadn't really thought about what happens if you're forced to use a standardized size of wood. My gut feeling would be that you'd probably use more wood, more fuel wood doing it that way, because you don't have the option of using the smaller stuff when you'd rather do it that way. You'll start with the bigger stuff the whole time. That would be my gut feeling. But yeah, that's an interesting one, I have to think about that one some more, thank you.