Origins and Evolution of Language
Week 4 tutorial briefing
Tutor notes

Comments for tutors are in italics.

As per last week, two aims for today:

1. *The obvious content goal is to read and talk about an interesting paper with an ambitious attempt to experimentally test whether you need language to sustain a particular type of stone tool technology – if so, maybe we can use these sorts of methods to infer something important from the archaeological record.*
2. *More generally, this is another opportunity for them to practice reading, summarising, and evaluating a research paper – they will be doing a bunch of this for their essays, so if they struggle with it you can offer them advice. E.g. even just the act of explicitly summarising the paper (either giving a verbal summary out loud, or writing down a 1-paragraph summary) can force you to realise what you do or don't understand. So if the summarising process is painful, encourage them to do this for the next reading. The questions are intended to help them think sceptically/critically about the paper's methods and conclusions, and several of these are standard questions you should be asking every time you read any paper.*

In this week's lecture and associated readings we have been looking at human evolution, with the aim of understanding the ecology that shaped the evolution of our species, but also in the hope that we might be able to glean some clues about when language evolved. Unfortunately, writing is a very recent invention, and spoken languages don't leave direct traces in the archaeological record. However, it might be possible to make inferences about when language evolved, or whether some hominid population had language, if we can infer the presence of language from something that does show up in the archaeological record – the reading for this tutorial focuses on tools, in the lecture I'll talk about potentially symbolic behaviours like ochre, beads, art etc.

*In the lecture I talked briefly about the challenge of inferring *anything* confidently from art-like behaviours (necklaces made from pierced shells, ochre marks on rocks, cross-hatching patterns in ochre) – personally I find It easy to believe that a creature that does those behaviours was quite like us and may have had a language like a modern human language, but if I was a sceptic I can see I would be completely unmoved by this kind of archaeological find. In the lecture I did talk about this cool paper where they actually try to infer the functions of these sorts of artefacts using experimental methods - Tylén and colleagues are running a whole series of studies doing more of this kind of thing and trying to reverse-engineer transmission pressures that might have been acting on these artefacts, I think it's very exciting and exactly the right kind of thing to do. The Morgan et al. paper is in the same spirit, trying to bring some experimental rigour to topics that have been purely the domain of speculation for a long time, so I am generally in favour, even if I find the interpretation puzzling in places!*

The question for this week's tutorial is therefore: can we infer the presence (or absence) of language from the presence (or absence) of certain types of material culture in the

archaeological record? Specifically, can we infer the presence of language from the presence of (a particular type of) tools in the archaeological record. The paper you will read, Morgan et al. (2015), takes a rather innovative experimental approach to try to answer this question, reporting a set of experimental studies where people acquire and transmit knowledge of how to make tools under different constraints on what kinds of communication are allowed. Read the paper, think about the following questions, and discuss in the tutorial.

Unlike last week there's no obvious videos or fun activity for this one – they did see a video in class of someone making Oldowan flakes (https://www.youtube.com/watch?v=SrvPOkMs4U4), but if you want to watch some additional stuff together there are tons of videos online – e.g. https://www.youtube.com/watch?v=7W_iR1T2r6I is a video from another tool-making experiment, or if you want a completely incomprehensible one without instructions try https://www.youtube.com/watch?v=EemvSe3uMlc, he starts knocking lumps off of things 2 minutes in. Or just google "Oldowan tool making" and look at the vids that come up.

Questions:

- What is the paper about? What did they do? What did they find?

Note that the paper is in an annoying format where the methods are at the end. I'd say: they are interested in the idea that Oldowan tool technology created a selection pressure for enhanced social learning, possibly including language, so they ran some diffusion chains to see how well people could learn (in 5 minutes!) the technology through different kinds of social learning, from reverse-engineering all the way to language-based teaching; the first person in each chain gets an expert demo, then they teach the second person and so on. They have many measure of quantity and quality of flakes produced, but the general result is that richer social learning is better and on some measures (e.g. proportion of viable flakes) there is a big difference between imitation and more directed teaching.

- What do you think the strengths of their experimental method are? What are the weaknesses? How could these be fixed?

You should be guided by your students and your own thoughts here, but personally I quite liked the idea behind the experiment – I think it's a very ambitious and imaginative way to attempt to address their question, there's not to many experimental papers I have read that mention 2 tons of flint in the experiment materials section!. I am more troubled than the authors by the very short training phase, and the fact that the skills are pretty rapidly lost – they seem pretty relaxed about this and are happy to extrapolate to what would have happened with longer training, I am not so confident, see below!

- Do their conclusions follow from the results they present? Are there additional (perhaps inconvenient!) conclusions they could have drawn but didn't?

They are pretty free in how they interpret their results, and for me their conclusions don't seem to match their results very well. For instance, they seem to conclude that imitation was sufficient for the maintenance of Oldowan tech – I am not sure where that comes from, I think it's based on their extrapolation to what would have happened had they given people

longer on the task, but by the same principle we could say that reverse engineering would be enough – why run the experiment if you won't be bound by the results? For instance, I think they could easily have concluded that language was required to keeo this technology stable for 700k years. I was also a bit puzzled why they said that Achulean tech requires language – again, I find it plausible, but how does that follow from the data they present?

I do like their point that more rich teaching is always better (assuming of course that more learning time doesn't remove this effect), which as they say suggests there's potentially a nice smooth selection gradient where natural selection can favour more and more sophisticated learning/teaching thanks to the tool payoff it provides, in populations that have discovered this kind of tech.

- Are there additional questions you could ask with a similar method? Or are there different methods you think would be better suited to answering this question? Or if you think this question is inherently unresolvable using experimental methods, why?

I think the central idea – that we can do better than speculating about the relationship between technology and features of cognition or communication, and actually test those links – is really great and definitely the right thing to do, but extremely hard. I'd like to see the same thing done (with much longer training!) for other technologies, and also I am curious what would happen to the social learning and transmission of artistic styles as discussed in the Tylén et al paper I talked about in class. In this paper they are restricted to messing with the form of social information people have access to during the learning task, which is a very clever way of simulating organisms with a different cognitive system from ours – if you really bought in to this method you'd want some way of manipulating people's cognitive resources or linguistic resources as well, e.g. thinking about how you could prevent people from doing social reasoning during the task, or only allowing certain kinds of linguistic construction, to simulate something other than modern human cognition and modern human language. I am also curious as to whether St Andrews undergrads are particularly hopeless at learning skills like these without explicit instruction - maybe a more resourceful population, not embedded in higher education, might be better able to learn more from less explicit instruction? Iyt would also be cool to see if you could ever get beyond maintenance/gradual loss of a technology over generations, and actually see new skills develop – but again, that is going to require a lot of training and practice on a task like this. But I am generally enthusiastic about these kinds of methods, maybe you'll have a more sceptical response, or maybe your students will.

- After reading the paper and discussing these issues, what conclusion do you draw on the question of whether we can we infer the presence (or absence) of language from the presence (or absence) of certain types of material culture in the archaeological record?

Despite liking the methods, I am not much further forward in this – I think in its current format their experimental data doesn't really help tighten up our inferences about the minds or communication system of our ancestors making these tools, and you can really see that from how freely they extrapolate from their results – other conclusions are possible based on their data! But it does at least give me some hope that a really big experimental effort along

these lines might have real potential. Tylén and co are having a real go at this sort of thing on the symbolic behaviour front, he has a large chunk of funding for 5 years, I am excited what they'll find there, I'd love to see something similar on tool use.