

SCIENCE AND PREHISTORY

Are we mature enough to handle it?

Åsa M. Larsson

Lidén and Eriksson ask a question: “Why is it that natural science in the service of archaeology is so provocative or even threatening to some archaeologists?” It is rather telling that they ask this not only of us but of themselves, based on their own personal experiences. This is both a valid question and an interesting way to highlight current issues, and it is also an angle that has more in common with the humanities than with the natural sciences they champion. That is because, while a scientific analysis of this issue (i.e. a quantitative study of terminology and citations) would perhaps add interesting data, it would not provide useful answers. For an assessment of human reasoning, responses and motives we need more qualitative methods. We need the humanities.

The filter(s)

The authors refer to the “filter”, the mental shield “held up against us, effectively preventing any communication”. This is an excellent way to describe a phenomenon that we must all agree does not just affect academic discourse in this particular instance, but also many others within and between disciplines. It can be a frustrating experience for all parties, and a deeply corrosive influence on research in general. To a certain degree, the filter may simply be due to the fact that sometimes researchers have fundamentally different paradigms about epistemology. But in my experience (anecdotal evidence to be sure) most people in academia do not hold diametrically opposed world views. Most agree that there are

some more or less objective facts that can be ascertained, which makes us accept that we can talk over the phone to someone in another part of the world, and that hearts can be transplanted. Just as most of us tend to agree that some things cannot be fully quantified, at least not in a way that allows us to make exact predictions for the future, such as great art and historical events. So the breaking point seems to be where we draw the line: to what extent can natural science predict and explain something intangible, such as culture, value and identity?

It is this grey area, rather than the extremes, that makes us crash head-first into the “filter”. I find it very interesting that Lidén and Eriksson take it upon themselves to identify the reasoning behind the various critical responses they have experienced to their research. According to them, the critique either comes down to “I don’t understand science”, or to “science doesn’t understand archaeology”. Both lead up to “so I don’t need to listen”. I cannot but wonder, though, if it is an accurate portrayal of the critique raised by archaeologists in the 2000s against interpretations based on scientific analyses of prehistoric remains? I know I don’t identify with either, and I do not really recall any colleagues expressing such harsh sentiments. Perhaps there is more than one filter in action here?

As everyone knows, the most effective way to debate with your opponents, whether in academia or politics or anywhere else, is to formulate their standpoint for them and then highlight its flaws. The validity of the argument, however, hinges upon whether that initial portrayal was accurate to begin with. It is also possible in many cases to find one or two examples that confirm that depiction, but the question remains whether these are indicative of the majority, or are statistical outliers. This is where source criticism comes into play, that indispensable and to my mind sadly undervalued method for both natural science and the humanities – the thing that separates academia from mere punditry.

Archaeology and science – old frenemies

It is gratifying that Lidén and Eriksson point out the long and continuous interdisciplinary nature of archaeology. They also make note of the cyclic nature of the prominence given (or not) to science in our discipline. History, as we say, repeats itself. When I was an undergraduate almost exactly 20 years ago, it was the virtually unique disciplinary crossover potential of archaeology that appealed to me, hesitating as I was as to whether to continue my education in evolutionary biology or in history. Here was a subject that would not force me to choose between science and the humanities.

Granted, the 1990s was a period with unusually fierce clashes between conflicting epistemologies. Having participated in conferences and seminars at that time, I saw the cuts made by both sides, which have resulted in some mental scars that will probably never go away completely. I cannot help but think that this created a filter among many who were active then, which makes them still perceive debates today in that light. At that period I usually found myself on the side pushing for a greater inclusion of science in archaeology. While I did not think science would solve all our problems I believed then, and still do, that some of our interpretations are more accurate than others, and that some can be tested and even partially verified with the help of scientific analysis of human remains and material objects.

Lidén and Eriksson are not in any way blind to the problems that can follow when researchers with a background in natural sciences take on issues that relate to human society and history. They highlight some examples of using archaeology as “cosmetics”, or using terminology unaware of its cultural and ethical implications. Some scientists make naïve and often faulty use of prehistory to explain their own results. It can quickly degenerate into tautology and tends to not cite any relevant current archaeological research to back up the claims, simply assuming the standpoint to be uncontroversial. The authors cite a study in the domestication of the dog as an excellent illustration of this. Another example is a cognitive study published in *Current Biology* on the colour preferences of men and women, which supposedly showed that women have a higher preference for shades of red (Hurlbert & Ling 2007). Leaving aside the fact that the study also showed that cultural bias also played a part, with less gender-based preferences among Chinese (to whom red is considered a lucky colour), the researchers still felt they had discovered a significant difference rooted in biology. They then interpreted the difference as being caused by the role of early human females as gatherers and family care takers, that it could have helped them find ripe fruit and quickly respond to emotional states.

The leap in reasoning is monumental, the connection to palaeontological research tenuous. However, it was this added “cosmetics” that helped the study receive wide notice even in the general press. We see here the innate paradox of combining science with archaeology. It is the *former* that warrants a study being published in prestige science journals and which gives its conclusions gravitas. But it is the *latter* that generates the “human interest” angle which will allow it to be publicized heavily by the editors and to be picked up by journalists in public media. A study testing a new method to extract DNA with less risk of contamination from prehistoric remains would certainly be publishable in a scientific

journal. But to be frank, the chances of having the paper accepted by a high-impact journal increases considerably if the method is then used as the basis for interpretation of prehistoric events. And without this extra flavour it has virtually no chance of being picked up by the general press. This is not something that has passed unnoticed by scientists.

Archaeology sells

Publishing, even science publishing, is business, and research is business too. There is a joint interest among researchers, their universities and the publishers to get the maximum possible attention, and this has increased notably in the past few decades. For researchers, and their employers, being published in a high-impact journal certainly increases the chances of getting additional funding. For the journals the competition is fierce to get the papers that will penetrate into general media, assuring the desired high impact (number of citations), subscriptions and purchases of advertisement. We should not be naïve about this. It does not mean that any of the reputable journals would ever publish something they feel is shoddy. However, it puts considerable onus on the process of peer review, which as many studies have shown is not in any way a guarantee of quality (Brembs, Button & Munafò 2013; Easterbrook *et al.* 1991; Ransohoff & Ransohoff 2001; Rehman 2013; Rice 2013; Zimmer 2012)

Peer review does not guarantee that the methods presented and the interpretations drawn from them are absolutely correct; it only tries to guarantee that there are no glaring errors in them. And even that is not always easy to do, as a number of notorious cases have shown. This is where the combination of science and archaeology can move into perilous territory, because cross-disciplinary studies are much more difficult to assess. Peer reviewers tend to be specialized in one discipline and will focus on that. It is also more straightforward to evaluate a scientific method than humanistic interpretations. Yet clearing the scientific contribution means giving credence to the interpretations, without really evaluating their validity. Sometimes an editorial will try to highlight that fact (Balter 2012), but this caveat is usually lost in the press release.

Scientists have criticized – rightly to my mind – occasional attempts by archaeologists to portray our terminology and cultural models as scientific. Despite repeated efforts, archaeology is still unable to accurately define prehistoric culture and ethnic groups based on material culture – assuming such groups even existed in the way we mean today, which is far from certain. It is paradoxical therefore to see geneticists use these cultural denominations in a very uncritical manner. The problem is compounded by the fact that the scientific journals publishing these papers do not put the archaeological models through anywhere

near the same rigorous scrutiny as the scientific methods. After all, it's only the humanities.

If we are to combine science and archaeology, then let's be scientific about it

To my understanding true scientific method involves a long and arduous process of testing, falsifying and verifying hypotheses, and that no study is better than the material at its disposal. If all experiments and analyses yielded absolute results science would progress in leaps and bounds, all articles in journals would be accurate, and there would be consensus among researchers at every new publication. We know this is far from reality. Physicists, biologists, chemists and even mathematicians are constantly in disagreement within their own fields. This does not mean science does not work, it just means that scientists are human, that they have preconceptions and filters that guide the questions asked and the answers received. It also means that they do not always have all the necessary data at their disposal to be able to get the answer they are looking for. Getting a data point, or even a set, is the easy part (comparatively); correctly deducing what it *signifies* (if anything) is a whole other matter.

Lidén and Eriksson mention the invaluable contribution of radiocarbon dating. This is an excellent example, because even in the case of ^{14}C we can draw incorrect conclusions if we do not understand all the factors affecting the process. Ergo the somewhat incorrect radiocarbon datings made in the 1960s and 1970s before calibration, adjustment for reservoir effect etc. The early analyses were not wrong, but they were not wholly right either. Likewise, quaternary geologists' estimations of shoreline displacement in Sweden after the Ice Age have occasionally been incorrect since it is a very complex process. When archaeologists questioned some of the models it was because the finds contradicted them, not because they did not believe in the validity of geology, or in science in general. We can also look at the "molecular clock" in evolutionary biology as an instructive example. Initially these calculations were presented as absolute facts and palaeontologists questioning some of the dates, which did not fit with the fossil record, were dismissed as being threatened by the new method or simply ignorant. Eventually it turned out there are several factors that affect the molecular clock within species.

What all these cases have in common is that the scientific methods in question have undoubtedly yielded great contributions to the study of prehistory, but also that any initial discovery will invariably be adjusted as our understanding increases. Caution and a measure of humility is therefore necessary for all involved. Claiming to have definitively solved

a major archaeological issue will certainly result in headlines and press coverage. But hyperbole of this kind is hardly conducive to interdisciplinary dialogue, and it can undermine researchers' trust in science. More problematically, approaching prehistoric cultures as genetically coherent groups sends a very dangerous message, and using 'science' as a free pass only compounds the damage. It is especially worrisome when we see researchers quoted in the press as looking for "our" ancestors, and identifying which prehistoric groups were not the ancestors of modern populations.

Of course we can, and should, draw conclusions based on the results from various scientific analyses. We should use every method at our disposal to glean information about the past and the people who lived then. But I feel that there is an urgent need for a more critical approach towards the source material by scientists. Analyses on human remains in particular must take into consideration chronology and geography first and foremost, and only much further down the line any kind of cultural-historical denomination invented by 19th- and 20th-century archaeologists.

If I were to put my finger on one thing that truly hinders constructive dialogue at this time it is the tendency to formulate one's opponents' argument for them. For instance, criticism of interpretations of prehistoric processes based on ancient DNA analysis of a few individuals have been portrayed by scientists as criticism of science in general. Is that really true, or just a convenient way of undermining your opponent? Rather than engaging with the actual archaeological objections, those who object are depicted as being averse to certain social models, such as large-scale migrations, on a purely emotional level (e.g. *Populär Historia* 2013, no. 5).

Concluding remarks

Are there filters at play in the interaction between scientists and archaeologists? Undoubtedly. Is this damaging to the study of prehistory? Certainly. Will we ever completely get rid of them? All research on human nature says no. But we should always strive to be better, to be open to criticism, new methods, alternative viewpoints. So I agree with Lidén and Eriksson that we must become aware of the filters that subvert the meaning of what is being said. But I think we are all guilty of that sin, and that scientists should perhaps not be so quick to think disagreement always stems from an aversion to science, or a lack of understanding of it.

We should celebrate the great advances made in science in the last decades that will aid our study of prehistory. We should be proud and excited that archaeology is a subject that is receiving far more attention

from the public. But we must also be careful not to use exciting narratives to score easy points, thinking that the study of human society is something that can be easily quantified, that culture and biology go hand in hand. We have gone down that path several times before, and it has caused irreparable harm to real people. We should never dismiss the political power that lies in the use and abuse of prehistory by people in all walks of life. We cannot hide behind science as an alibi, a free pass to state what seems to be immediately obvious but may in fact turn out to be more complex. If history has taught us anything, it is that we lost the right to be that naïve a long time ago.

Åsa M. Larsson
Stiftelsen Societas Archaeologica Upsaliensis
Box 15028
750 15 Uppsala
Sweden

REFERENCES

- Balter, M. 2012. Ancient Migrants Brought Farming Way of Life to Europe. *Science*. Vol. 336. No. 6080: 400–401.
- Brembs, B. Button, K. & Munafò, M. 2013. Deep Impact: Unintended Consequences of Journal Rank. *Frontiers in Human Neuroscience*. Vol. 7. No. 291.
- Easterbrook P. J., Berlin J. A., Gopalan R. & Matthews D. R. 1991. Publication Bias in Clinical Research. *The Lancet* 337(8746): 867–872.
- Hurlbert, A. C. & Ling, Y. 2007. Biological components of sex differences in color preference. *Current Biology*. Vol. 17. Issue 16. R623–R625.
- Ransohoff, D. F. & Ransohoff, R. M. 2001. Sensationalism in the Media: When Scientists and Journalists May Be Complicit Collaborators. *Effective Clinical Practice* 4(4): 185–188.
- Zimmer, C. 2012. From Darwinius to GMOs: Journalists Should Not Let Themselves Be Played. The Loom. *Discover Magazine* 21 September 2012.

Internet sources

- Rehman, J. 2013. The need for critical science journalism: Too much contemporary science writing falls under the category of “infotainment”. *The Guardian* 16 May 2013. [online] Available at: <<http://gu.com/p/3fq7q>>
- Rice, C. 2013. Science research: three problems that point to a communications crisis. *The Guardian* 11 February 2013. [online] Available at: <<http://gu.com/p/3djcp>>