

Current trends and hot keywords: revisiting the impact of ‘interdisciplinarity’ and aDNA research for the archaeology of human remains

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Abstract: With this paper I propose a reflection on the way interdisciplinarity is framed in reference to the study of archaeological human remains. It is often taken that interdisciplinarity is self-evidently valuable for archaeology - but why think this? Therefore, by taking the case study of the way ancient genomics research is rewriting the ‘Neolithic Revolution’ narratives I will show how the use of scientific methodologies influence and bias the kind of work that gets done and the questions that are asked.

Key words: interdisciplinarity, DNA, archaeology, method, narrative

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‘The problem is that evaluation is now led by the data rather than by judgement. Metrics have proliferated: usually well intentioned, not always well informed, often ill applied.’¹

Arlette Farge (2013 [1989]) wrote in *The Allure of the Archives*, how once the researcher finds themselves in the midst of the archives they are overwhelmed by the illusion that here one is in immediate contact with the voices and witnesses of the past; if they would listen carefully, then reality, as it was, will emerge from the pages. However, the historian soon understands that unfortunately this is not the case, as this ‘space of captured speech’ (2013:79) is forever incomplete, so the stories within need to be tied to a bigger narrative if they are to gain meaning. Her account is wonderfully pertinent to the work of archaeologists who are often caught in the same illusion as the historian in the archive: that by applying the correct and sufficient methods, the past will reveal itself. This aspect becomes especially relevant in light of new ‘interdisciplinary’ trends whose results appear self-evidently objective and in no need of a further narrative. Instead, it is important to understand just what interdisciplinarity can do to solve methodological challenges for archaeology.

Given the fragmentary nature of the material record, archaeologists are ever-expanding their intellectual and methodological tool-box, going beyond the disciplinary boundaries, and involving themselves in what are often called interdisciplinary projects. Alison Wylie and Robert Chapman (2016:15) raise in their latest book the interesting point that this phenomenon is closely tied with an ‘epistemic anxiety’ inherent to archaeological reasoning, namely the fear that there is only so much that we can learn about the past, especially if this knowledge is to be ‘objective’. I would claim that in archaeology we now see a structuring of discourses around interdisciplinarity as a way of framing relevance and innovation- in the face of the ‘manifold and messy’ problems of life and society to quote Frickel and colleagues (2017) (and also as a result of external pressures from funding bodies)². This interdisciplinarity seems though to incline more and more towards the natural and hard sciences, as a way of grounding the discipline, and of delivering measurable and seemingly objective facts. ‘DNA secrets of Ice Age Europe unlocked’, ‘DNA Analysis Shows Modern Europeans Descended From Belgians’, ‘Ancient DNA solves mystery of the Canaanites, reveals the biblical people’s fate’³ are only a handful of recent titles of research-turned media headlines, texts in which DNA, isotopes, carbon dating appear alongside phrases such as rewriting history, new light on the past, or complexity. We are witnessing a writing of narratives on past lifeways in scientific terms, with the methods employed presented as being more rigorous than traditional archaeological methods, as Julian Thomas (2015:11) points out, they ‘are now able to answer archaeological questions that were hitherto

¹ <https://www.nature.com/news/bibliometrics-the-leiden-manifesto-for-research-metrics-1.17351>

² The years 2000s have seen the apparition of new ‘interdisciplinary’ programmes and institutions: the UCLA Institute for Society and Genetics, Max Planck Institute for the Science of Human History (Jena), the Leverhulme Centre for Human Evolutionary Studies (Cambridge), not to mention that ‘interdisciplinarity’ is an omnipresent requirement in most grants/fellowships (certainly for the EU funded ones)- and after the Post-Processualist fashion of the 1990s and early 2000s, employing multiple humanist disciplines in answering a research question is not usually considered as enough interdisciplinarity in archaeology any more. A series of recently organised events at major international archaeological conferences also point out at the existence of such concerns (CE TAG 2017, EAA 2017 has six sessions and a dedicated key-note lecture), though the perspectives on where to take these trends varies between authors.

³ <http://www.bbc.com/news/science-environment-36150502> (May 02, 2016, BBC News); <http://www.scienceworldreport.com/articles/39348/20160505/dna-analysis-shows-modern-europeans-descended-from-belgians.htm> (May 05, 2016); http://wapo.st/2tN4NMX?tid=ss_tw&utm_term=.e0da2dcabdf (July 27, 2017) (All accessed July 2017).

metaphysical'. However, archaeologists tend to operate under the illusion that bringing together data generated inside these various disciplines and paradigms is unproblematic (see also Bickle & Whittle 2013:15), but important epistemological concerns are raised when, for example, archaeology draws genetic or biological data into cultural narratives. Especially when it comes to the study of human remains this is important, and raises ethical concerns, because one thing is to focus on reading 'objectively' the traces of past agencies inscribed on biological bodies (see Ion 2016), and another to talk about individuals with agency, living in a certain context. Furthermore, as the examples above illustrate, such narratives are prone to be picked up by media, and they are easy target for political agendas (in a large understanding of the term), which invites us to be cautious.

Thus, in this article I will tackle three problems: (1) that this multi-disciplinary data, especially the one resulted from 'hard' sciences is not integrated successfully with historical and cultural contexts (and thus fails short in accounting for the historicity of the traces of the past), that (2) these new datasets bias archaeologists to focus on particular questions and (big) scales of analysis, and that (3) this raises the question of how would a truly integrative narrative look like? To reflect on these issues, I will firstly discuss a high profile example-the analysis of Richard III remains-, and then move to a more substantial case study, that of ancient genomic research into the 'Neolithic revolution'. Finally, I will conclude by highlighting the particular voice that archaeology can have in establishing itself as a strong interdisciplinary endeavour. Ultimately, this is not an exercise whose aim is to annul the effort of (osteo)archaeologists, scientists, and mortuary practitioners. Rather, by taking a critical approach towards the way in which the body is understood in interdisciplinary projects, it is my intention to bring forth the concept of *value* (why do we find these methods valuable to us?). And I think that precisely the belief that these methods provide better answers to old archaeological questions deserves investigation.

Interdisciplinarity, (osteo)archaeology and the impact of 'hard' sciences

'Interdisciplinarity, in short, has no inherent meaning' as Julie Thomson Klein (2005:63) rightly points out. Currently, there is quite a broad literature showcasing the importance of interdisciplinary data in archaeology (see studies in Bickle & Whittle 2013; Killick 2005; Killick & Goldberg 2009; Kluiving et al. 2017; Martinon Torres 2015; Pollard & Bray 2007; Samida & Feuchter 2016; and in reference to the study of human remains see the analysis of Nilsson Stutz 2016), however most of these texts do not delve into the challenges of defining what the concept means for our discipline, the epistemological implications or ontological assumptions. Beyond the enthusiasm for so many available tools and methods, what is the fundamental question that such research is trying to answer, and does interdisciplinarity really help us get there? A look at the specialised literature (e.g. Klein 1990, 2010; Frodeman et al. 2017; Moran 2002) reveals that the concept is directly linked to what might be called the 'specialization of difference' (Klein 2005:39)⁴. Interdisciplinarity has been put forward both as an integrative framework for data coming from various directions, with the goal of obtaining a unity of knowledge, but also as a particular way of localised problem solving, to address the challenges of certain situations (see a more elaborate discussion in Klein 2005:31). In archaeology, its meaning has referred to both of these dimensions, and Gavin Lucas (2015) links this tension between top-down and bottom-up theorizing with a whole set of oppositions between empirical and interpretative focus, deductive and inductive reasoning.

But in order to start the investigation into what this means for contemporary archaeology, we need to set some signposts along the way. This is especially important in the

⁴ In time, various related terms emerged- multidisciplinary, transdisciplinarity etc, trying to ground the notion in more precise definitions, to capture the way in which various kinds of data are linked to one another (see Huutoniemi et al. 2010).

context of a breaking down of a unitary approach as Kristian Kristiansen (2014) would say, multiple archaeologies seeming to coexist (see also Lucas 2015:13), which makes difficult to pinpoint a clear-cut set of standard agreed upon norms in archaeology. Therefore, the three inter-related issues which structure this discussion are: (a) archaeology has been borrowing methods from other disciplines in order to address the fragmentary nature of the record, but (b) nowadays these methods seem to lean more towards the ‘objective’ disciplines. This in turn has (c) an effect on the kinds of questions which archaeologists ask, picking questions which have ‘impact’ –both in terms of academic publications, and media attention.

In its quest for going beyond the limitations of the archaeological record, archaeology has taken from the start a pragmatic approach, borrowing tools from other disciplines- both intellectual and practical- from the stratigraphic concept in early 19th century geology, typological ordering of materials taken from the natural sciences, to evolutionary theory, or ethnographical analogy. These methods and concepts have become embedded in the archaeological episteme: they are generally accepted and are rarely viewed as interdisciplinary endeavours- they are constitutive of the way in which the discipline was created. Gavin Lucas (2015:15) thinks that their borrowing has not been a mechanical act, simply copy-pasting them into archaeological frameworks, but rather ‘we have also made [them] our own, exploited its affordances and developed a very different set of techniques’ based on them.

Nowadays we witness a growing interest in combining datasets coming from the ‘hard’ sciences, which Kristian Kristiansen (2014) labelled as the Third Science Revolution in archaeology. Along the same line, Marcos Martín-Torres and David Killick claimed in their 2015 (1) article that they think: ‘Archaeological science is central to contemporary archaeological theory and practice, and will become increasingly important in the foreseeable future’, and indeed this seems to be the case (see also Torrence et al. 2015; Wylie 2017). But with the application and refining of the new scientific methods we also witness a change of focus and scale of archaeological topics: genetic data and statistical modelling determined a renewed interest in migrations and history of human species, chemical elements analysis (strontium, isotopes) have allowed the study of diet, geographical sources, and ‘long space exchange’ (see also Killick 2015), and at the same time radiocarbon dating and the use of other scientific techniques have been used to refute old assumptions. Paralleling trends in other disciplines, the use of such methods and technologies seems to have led to a growing focus on Big Data analysis, bringing in turn a change in the scale of analysis. For example, if one picks ancient DNA data, such data works at a macro-level of analysis- group/population, larger time frames- and hence the research hypothesis will inherently follow the same scale of the analysis.

A relevant case where we start seeing the impact of these new scientific techniques in stirring archaeological projects is the frenzy of unearthing medieval kings’ bodies in order to fix their identity (see a critical discussion in Ion 2017, also Toon & Stone 2017). In the much publicised case of the unearthing of the supposed remains of Richard III, multiple researchers’ expertise has been mobilised to obtain different kinds of data, from osteological, to DNA and archaeological, all with the result of focusing on a question which is not actually a traditional archaeological one: who is X body? Why did the research, as suggested by the project’s page (<https://www.le.ac.uk/richardiii/>), and the results presented in the media, focused so much on pin-pointing a name to the body, as a goal of research, very similar to a forensic investigation, when the published data told a somehow different story (theoretically this was an investigation of the former monastery grounds, see Buckley et al. 2013)? As Mary Beard pointed out: ‘Gt fun & a mystery solved that we’ve found Richard 3. But does it

have any HISTORICAL significance?⁵, while Charlotte Higgins, chief culture writer of the Guardian greatly highlighted⁶:

‘I’m not saying it’s not good fun, and indeed mildly interesting, that the remains of the last Plantagenet king have apparently been found. [...] I’m just suggesting that it’s rather a limited avenue of historical research that seems to have much to do with the dread word “impact” [...] than with pursuing a genuinely intellectual field of enquiry.’

What happened in this case is that by placing at the center of the investigation the scientific analyses into the materiality of the body (genetics, pathology etc.), its focus shifted from a historical investigation to an endeavour that put a face to an already known story. It should also be mentioned that what can be noticed when looking at how data has been prioritised in press conferences and not only, the molecular evidence was favoured against historical interpretation, and DNA being picked as the nail in the coffin of the interpretation, the piece of evidence which proved without a doubt the identity of the person in question. This trend is though part of a wider cultural phenomenon which transcends the academic arena, a truly ‘DNA mystique’ (Nelkin & Lindee 2004)⁷. Stable, reliable, and definite answers have always been preferred to relative positions by the wider public as well, and I think we undergo times when the academic realm and the public’s voices influence each other.

However, even though some might assume that these issues are confined to such high-profile projects, and are mostly due to media’s reading of research results, I would say that this example brings to the fore a more complex problem which affects the way archaeologists are negotiating relationships between kinds of evidence. And Richard III case is just the tip of the iceberg. As we have seen above, traditionally archaeology has been employing results coming from other disciplines in order to help it raise its interpretative scaffold: these were bits of evidence used as supporting arguments, helping in building a case for its leading question. But what seems to be happening now is that one (or several) of these bricks-the scientific datasets- takes centre stage and modifies the blueprint and the hypothesis. The allure of these ‘bricks’ resides in their apparent intrinsic objectivity, and universality- as an illuminating line from the genetic report on Richard III states: ‘Further genetic research will not change these conclusions.’ (Buckley et al. 2013:536). In reality, what constitutes a fact depends on the agreed norms in a discipline at any one time, and in order to gain archaeological meaning, it needs to be tied in with a meaningful question. Otherwise, employing scientific techniques might not even respond to relevant research questions. But to what extent is this biasing of research questions happening?

Case study: the way ancient genomics research is rewriting the ‘Neolithic Revolution’ narratives

So, let us move forward and evaluate closer this apparent superiority of evidence coming from natural sciences, and observe how new evidential claims are taking a lead of the investigation by looking at the effect of ancient genomics research on the ‘Neolithic Revolution’ narratives. In what follows I will look at how the old archaeological question of

⁵ <https://www.theguardian.com/science/blog/2013/feb/04/richard-iii-skeleton-last-plantagenet-king-live#block-510f973495cb11c46b649da9>

⁶ <https://www.theguardian.com/culture/charlottehigginsblog/2013/feb/04/richardiii-archaeology-leicester-scepticism>

⁷ There are of course many studies pointing to the limitations of genetic data (e.g. Kaestle & Horsburgh 2002; Mirza & Dungworth 1995).

Neolithisation is tackled through new scientific methods, the problems raised by these, and the kind of body that such narratives imagine.

The transition to a Neolithic way of life, with all that it brought to the history of human civilisation, has always captured the interest and imagination of archaeologists since the early days of the discipline (for some recent studies see Bickle & Whittle 2011; Manen et al. 2014; Reingruber et al. 2017). After the Post-Processualist years, when narratives seemed to focus more on smaller scale cases and on individual agency, the last couple of years have been marked by a rise in numbers of articles tackling the Neolithic Revolution by applying ancient genomic analysis. The fact that these are published in high-impact journals such as *Nature* and *PlosOne* is telling about the need of the scientific community to obtain some answers to a century old debate: how did the process of Neolithisation happen, what brought it about, and how did it spread?

The old debate between a demic versus a cultural diffusion of ideas is tackled through an investigation of ancient human genome, which is then compared to other ancient populations' or with modern samples (e.g. Fernández et al. 2014; Fu et al. 2012; Omrak et al. 2016). These new projects are often trans-border projects, comprising large teams, and they tend to link the generated data to big narratives: such analyses span a wide geographic area, and they usually cover a long timescale, e.g. studies looking at 'Linearbandkeramik populations' comprised individuals over 600 years (Haak et al. 2010), another study looked at 1900 years of PrePotteryNeolithicB populations (Fernández et al. 2014), while a study on the South East Europe covered 5 and 1/2 millennia (Hervella et al. 2015). This kind of approach is on the rise, after 2005 one seeing a major leap in numbers, and their number keeps growing by year⁸. Though one might argue these are just genetic articles and not interdisciplinary per se, they normally have archaeologists as co-authors, and employ a range of archaeological information, from contextual data to dating, not to mention that their results are presented as settling this old archaeological question. Furthermore, these scientific methods tend to prove seductive-as the case of Richard III demonstrated, and they seem to become a staple, a method to be followed by other archaeological projects. It is hard to imagine a project which integrates the study of Neolithic human remains in its analysis and does not apply genetic methods (or plans to in the future), while a look at the current and past ERC funded archaeology projects shows that in 17 out of 57 projects (29.8%) genetic data is explicitly part of the interpretative framework (and in 15 of them it is isotopes). Also, sitting through talks on the interpretation of human remains from Prehistoric settlements (from Anatolia to UK) during the past year revealed a generalised hope of researchers that aDNA studies might shed some light on the otherwise puzzling selection of individuals, and thus take the interpretation out of the impasse it is now facing. Thus, undeniably such studies are having an impact on archaeological reasoning, and for these motives I think one needs to take a closer look at the assumptions which structure such endeavours.

In short, these projects assume that:

- the Neolithic transition to agricultural ways of life in Europe is a process with an important demographic impact (often placed in the same line with the migration of *Homo Sapiens Sapiens* into Europe and the Bronze age migrations);

⁸ In the particular case of analysis of human remains from Balkan Neolithic settlements, it is interesting to note that around 2007, with the apparition of ancient DNA (aDNA) analysis on such human remains, a more profound change happened. Before, genetic articles tried to write historical narratives on the potential Neolithic diffusion model by analysing modern DNA, and subjecting it to statistical modelling to identify the contribution of Neolithic genomes (e.g. Chikhi et al. 2002; Currat & Excoffier 2005). The introduction of aDNA techniques brought the human remains to the fore: they take the importance of historical sources, and hence their materiality holds clues to the past.

- that these migrations took the shape of distinct archaeological cultures; thus, implicitly or explicitly, a certain group of people's genetic makeup is linked to a specific archaeological culture based on the assumption that they are more similar among themselves than to other cultures;
- these archaeological cultures (implicitly and populations) are geographically specific and temporally bound;
- by charting populations movement one can chart the spread of Neolithic and explain its extension/appearance in a certain area.

These raise some immediate problems: (1) methodological, regarding the sample size, and the relationship between hypothesis and the applied method, and (2) epistemological: they are reductionist in terms of interpretation potential, and they also limit the understanding of human beings to biological entities. So let's take them in turn.

The methodological points which open these approaches to a critical inquiry are: the small sample size (in best cases a dozen individuals spanning quite long time intervals), the terms of comparison are not always equal among themselves (in some cases aDNA is compared with aDNA, and in other cases with modern DNA samples, and in even more confusing situations- both time horizons are involved), and there are statistical choices made when modelling population affinities - and in virtue of being a choice they are open to alternatives.

When it comes to the epistemological concerns, most of the above mentioned projects' assumptions have been well addressed by Heyd (2017) in a recent article appropriately entitled 'Kossina's smile', where he clearly shows how this approach brings nothing new in terms of a conceptual understanding of the Neolithic process: in a Gustav Kossina (1858-1931) type of account, material cultures are tied to ethnicity and things believed to change due to an external input of population (a classic early 20th century diffusionist model). In trying to see if the Neolithic 'tool-kit' (dwellings, agriculture, pottery) has been brought over by certain people, the 'Neolithic' man (may s/he be from the Starcevo-Cris, Dimini, or Gumelnita culture) is sampled for DNA, and then compared with other 'Neolithic' individuals from some other places/cultures. This situation is puzzling because even though 'archaeological cultures' are generally understood as being mere conventions, inherited from a time when academics thought that a certain ethnicity was tied with a certain material culture, in such analysis they become the basis of analysis.

Furthermore, operating within a distinction between cultural transmission and genetic input, even though some authors take a more nuanced approach, is reductionist. Not only that the wide scale of analysed space is problematic-the Balkans, central Europe, Anatolia-, but more importantly this does not try to understand what Neolithisation means, what changes were brought in, the new ways of working through the environment (see Barrett 2014), and the adaptations it required. By simply saying that people moved one does not get closer to the matter. If one wants to see the dispersal of certain genetic makeups this can be a valid approach- the genetic diversity of these populations can be a useful question for geneticists. But for archaeologists it is not very interesting, or better said not in the way it is interpreted, as this should be the start of an interpretative inquiry, and not the end result- it is just data in want of a narrative. From historical and social theory investigations we have gained a deeper understanding of migrations and the various forms they can take, as the new arrivals have different impact and genetic input: e.g. in the US the white British settlers had a different impact than the Italian and Mexican immigrant waves in respect to material culture, institutional or political configurations; the Bulgarians or Normans migrations during the Middle Ages had important political impact, though less so at a demographic level. Genetic data alone cannot tell a specific narrative, that is to say, the *whys* and *ways* in which things

happened, and such analysis are certainly not interdisciplinary in their structuring. As Agathe Reingruber and colleagues (2017) rightly point out in the introduction to their recent volume, when looking at the Balkan area, ‘if one is to understand the complex process at work they need to understand the interplay of various factors and ways of life’ (the impact of hunters, foragers and fishers, and to take into account the multi-directional nature of exchanges).

The problem with this route has also an important ontologic consequence, as by viewing the body as a biological entity, decoded in terms of genes is a model which frames identity in genetic determinism, instead of one placing human agency at the core of its interpretation. For a humanities or social sciences perspective the interpretation of the body goes beyond, as what is interesting to see is how one responds to external and cultural factors, how such events shape their identity and how this is represented in the face of new changes. Thus, on the one hand we have a discourse focused on populations, big data, modelling movement – what people ‘might have done’, and another type focused on localised refined case studies, smaller scale of focus, and where the body is an integral part of a wider package. Both ends of the spectrum can be interesting in their own right, depending on what question one is trying to answer, but trying to combine them in order to create a truly novel and interesting interdisciplinary research presupposes the need for a strong interpretative framework that would allow one to move from the particular to general, and to link the parameters in a meaningful way. When genetic data is seen as a (better) answer to old archaeological questions, what is actually happening is that genetics takes on to settle a debate which has been framed in a different kind of interpretative framework and using specific concepts-archaeological culture, cultural periodization (Neolithic, Bronze Age etc.), material culture in order to make sense of its results. Thus, the archaeological concept of culture gets translated to ethnic identities (individuals tested are identified based on their cultural identity and proximal affinity), which are then analysed through genetic methods, ultimately interpreted in terms of cultural processes.

Archaeological science versus scientific archaeology

After we have seen how the new methods of aDNA research limit the interpretation of the processes discussed, we are left with the question: is this the only way in which the relationship between natural/hard sciences evidence can be framed in archaeology? Concerns as to the limiting effect of scientific methods in archaeology have always been present, especially when it comes to the study of human remains- Liv Nilsson Stutz sees the geneticists work as ‘mining burials for material may also cause ethical challenge’ (2016:25), Alison Klevnas points out that ‘populations’ are not ‘convincingly defined’ (2016:53), while others highlight how the scientific analysis of the body are sometimes taking ‘an alarmingly deterministic turn’ (Gowland&Thomson 2013:13). This plays in the wider debates on the disciplinary divide between osteology and funerary archaeology (see Joana Sofaer’s work), or more recently burial archaeology versus the archaeology of death (Nilsson Stutz 2016). These ultimately relate to the half century debate on the division of the Two Cultures, humanities versus scientific approaches.

However, I propose that we think of these issues from a different angle: trying to tackle these divisions will always prove problematic given that archaeology has always been riddled with hard/natural sciences data on some level or another. So in fact the question is: what value do we want to ascribe to scientific data? To answer the question, I think we need to start from a useful distinction raised by Marcos Martín-Torres and David Killick (2015) between archaeological science and scientific archaeology, and then look at the lessons that the history of archaeology can teach us in that respect, especially the Processualist experiments.

The term archaeological science refers to the borrowing of scientific methods in archaeology, while scientific archaeology has a more epistemological bearing, as it implies equating archaeological interpretation with natural sciences interpretative frameworks: 'the conviction that archaeology should model its methods of inquiry and inference upon those of the natural sciences' (Martinón-Torres & Killick 2015:2). I would claim that what we are currently witnessing is a move from the first to the second category- projects in which DNA, isotopes etc. are not merely an annex of the text, but bring/model the kind of questions asked, e.g. establishing genetic lineages, dispersal models, or diets are not mere means to an end, but they become the main topic of the analysis- and the body is fixed as a biological entity. While archaeology has always involved some kind of the first relationship (at least when it comes to imagining its field methods, its stratigraphic outlook and so on), the first time in the history of the discipline when it leaned towards a scientific archaeology was with the New Archaeology of Lewis Binford. Under the influence of philosophers such as Ernest Nagel, Rudolf Carnap, Carl Hempel and Karl Popper, this paradigm's neopositivist aims were in search of a scientific and 'complex' perspective to integrate the material remains of the past. Binford opposed the view that the archaeological record is limited in respect to the kind of information it can yield, and he proposed that, in contrast, the record should be imagined as the result of past dynamics:

'The archaeological record is at best a static pattern of associations and covariations among things distributed in space. Giving meaning to these contemporary patterns is dependent upon an understanding of the processes which operated to bring such patterning into existence. [...] One cannot easily obtain such knowledge and understanding from the study of the archaeological remains themselves.' (Binford 1980)

He proposed a method based on model building and hypothesis testing, grouped under the name of middle-range theory, a hypothetical-deductive model (according to Bell 1994:125) or rather probabilistic-statistic (Spaulding 1968:36), one that could be a bridge between data and cultural processes. This echoed Charles Hempel's proposed methodology for historical investigation of an 'establishing universals by confirmation' (Bell 1994:125), supporting a scientific approach to a narrative one. Thus, the New Archaeology raised a couple of interconnected points: a re-evaluation of what the material remains stand for (not the past, but a record of past dynamic relationships), how this should be decoded (in a scientific way- by building inferences between data and theory), and a systemic view of the record, a look for universal models to explain particular configurations. In reference to our discussion here, and the role of science in archaeology, it did two things: seeing anthropology (archaeology) as a science, sharing many types of explanation patterns with hard sciences, and also led to the appearance/multiplication of the use of sciences in archaeology: from statistics to osteology, archaeozoology, geology etc. Even so, these observations were subsumed to a wider archaeological interpretative framework and question: 'how and why such systems change'- changes in landscape, climate, materials, were linked to an internal functionalist logic, all trying to model human interaction in an ecological environment.

Binford wrote this in his seminal paper 'Archaeology as Anthropology' (1962):

'If migrations can be shown to have taken place, then this explication presents an explanatory problem; what adaptive circumstances, evolutionary processes, induced the migration (Thompson 1958: 1)? We must seek explanation in systemic terms for classes of historical events such as migrations.'

And here we see how he stresses the importance of explanation versus explication, with migrations and other topics being classified as classes of historical events, which need an explication in a 'systemic term'. Of course, how one understands the system- the relationship between structure/parts/links might vary. These approaches were later criticised by the proponents of the Post-Processualism approaches, claiming that the search for universals hindered an investigation of human agency. While I agree with this critique, I would say that the New Archaeology philosophy was right in one respect- reading the material traces as past dynamics which need a broader explanation (going beyond a simple class of event).

Therefore, the question is how to integrate these new data in order to go beyond the limitations of Processualism (mostly the absence of individual agency in driving change), to use the potential of the new genetic and other scientific results, but in a meaningful way for an archaeological narrative?

Archaeology as story-telling

So far we have seen that (1) a certain epistemic anxiety leads archaeologists to (2) turn towards scientific methodologies for writing more reliable narratives, but this (3) raises several issues, most importantly the problem of integrating them in historical narratives. While I mean in no way to dismiss the value of scientific methods for archaeology, or imply that all interdisciplinary projects follow this pattern, my claim in this article has simply been that usually what is deemed interdisciplinarity research is nothing but collaborative multi-disciplinary problem-solving approaches, where the research agenda is driven by one of the datasets involved; also that these new scientific datasets should not be seen as the Holy Grail we have been waiting for, the answers to our old questions, because at the moment, their interpretation and integration seem to be problematic. Data is good as long as is useful to us, but not when the methodology becomes unquestionable dogma or the goal of research. We should think more of how this integration should take place, otherwise we end up with a Frankenstein type of approach, where disparate parts are brought together in an attempt to make them fit. Thus, how do we solve the problem of integrating various kinds of materials?

At present I think there is no clear answer to this, but a way forward might be to see archaeology as a powerful kind of story-telling, focusing on the weaving of narratives that can link the particular with the general in an integrative framework, thus providing explanation and tackling the historicity of processes in their complexity. In the dedicated latest issue of *Studies in the History and Philosophy of Science A*, philosophers of science show how the narrative is a powerful kind of explanation, as it can situate evidence, and highlight causal links (Morgan 2017; Morgan & Wise 2017). Though it can be speculative it can also 'aid in overcoming local underdetermination by forming scaffolds from which new evidence becomes relevant' (Currie & Sterelny 2017). Archaeology deals with large time frames and spaces and in this way narratives can link the particular with the general in an integrative framework, to track changes and understand how they came about. In this way, disparate elements are not only given coherence and are related one to the other, but they are also constitutive of a theory of sociality. And when we imagine such a narrative, we can bear in mind the words of Tim Ingold (1990:221):

'If social life presumes the existence of persons, then clearly any account of social evolution must start out from a theory of how persons are possible. In other words we require a theory of sociality. By sociality I refer to the generative properties of the relational field within which persons are situated.'

Genetic, isotopic, or dating results have no intrinsic meaning- they are useful elements when they are interpreted in a historical and/or anthropological key, and when for example

migrations, settlements, typologies and resources choices are seen as the results of certain kinds of sociality, ways of becoming human throughout the centuries and millennia. In this weaving of narratives an interesting inspiration can be found in the field of historical theory, which has a tradition in questioning how to deal with combining multiple sources of evidence. Instead of attempting to make archaeology more objective and science-like, taking it towards mathematical models, we should embrace exactly what made it strong and a source of inspiration throughout decades: its contextual, and genealogical reasoning approach. What others pick up about archaeology as its strength, from Foucault to psychoanalysis, from digital humanities terminology to the public's imagination, is its ability to construct a narrative by grounding material traces.

We should aim at thinking of humans past and of their possible worlds as the historian Carlo Ginzburg would have stressed. In this regard, he also highlights the specificity of the historical representation (Ginzburg 2012:58):

‘At this point the divergent perspectives of the judge and the historian seem clear. For the former, the margin of uncertainty had a purely negative significance and might have resulted in a non liquet, or, in modern terms, a dismissal for lack of evidence. For the latter, it sparked further investigation, to link the specific case to the context, here understood as the realm of historically determined possibilities. The biographies of Davis’s personages resemble, from time to time, the biographies of other “men and women of the same time and place,” reconstructed wisely and patiently [...] “True,” “probably,” “proofs,” and “possibilities” are interwoven, while at the same time remaining rigorously distinct’.

What is ultimately at stake is how we choose to frame humanity and individuals through our narratives. Human remains when becoming subjects of multi-disciplinary analysis, are framed as a particular kind of sign in relation to the past- their materiality (the biologic makeup) is seen as a way of inferring historical processes (such as migrations and movement, health and lifestyles). Their dual state- once living beings, and now part of the natural realm, makes them what Marko Marila (2012), inspired by the French philosopher Michel Serres, calls quasi-things, not fully subjects, but not truly objects either. At present, these projects seem to target the material dimension of the remains, what ties them to this natural realm. Even though scientific methods are seen as a more reliable way of writing a narrative on the past as they seemingly provide a more comprehensive and objective evidence – measurable, testable, and reproducible, in reality they fail to account for the alterity of the material record, and of the human beings. Therefore, we should make use of such scientific data, but we need to turn the collaborative projects on their head: to devote our energy to building relations and to defining the ‘generative properties’ of the systems we encounter. In this way one can truly start on the way towards an interdisciplinary approach, and in building a strong case for the value of archaeology in 21st century science and society.

References

- Barrett, J. C. 2014. The material constitution of humanness. *Archaeological Dialogues*. Vol. 21 (1). Pp 65-74.
- Bell, J. A. 1994. *Reconstructing Prehistory: Scientific Method in Archaeology*. Philadelphia: Temple University Press.
- Bickle, P. & Whittle, A. (Eds.) 2013. *The First Farmers of Central Europe: Diversity in LBK Lifeways*. Oxford: Oxbow Books.
- Binford, L. R. 1962. Archaeology as Anthropology. *American Antiquity*. Vol. 28 (2). Pp 217-

- Binford L. R. 1980. Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity*. Vol. 45 (1). Pp. 4-20.
- Buckley, R., Morris, M., Appleby, J., King, T., O'Sullivan, D., & Foxhall, L. 2013. 'The king in the car park': new light on the death and burial of Richard III in the Grey Friars church, Leicester, in 1485. *Antiquity*, Vol. 87. Pp. 519–538.
- Chikhi L, Nichols R.A., Barbujani G., Beaumont M.A. 2002. Y genetic data support the Neolithic demic diffusion model. *Proc Natl Acad Sci USA*. Vol. 99. Pp. 11008–11013.
- Curat M., Excoffier L. 2005. The effect of the Neolithic expansion on European molecular diversity. *Proc Biol Sci*. Vol. 272. Pp. 679–688.
- Currie, A. & Sterelny K. 2017. In defence of story-telling. *Studies in History and Philosophy of Science Part A*, Vol. 62. Pp. 14–21.
- Eerkens, J. (ed.). *Interdisciplinary Contributions to Archaeology Series*. Berkeley: Springer.
- Farge, A. 2013 [1989]. *The Allure of the Archives*. Yale: Yale University Press.
- Fernández, E., Pérez-Pérez A., Gamba, C., Prats, E., Cuesta, P., Anfruns, J., Molist, M., Arroyo-Pardo, E., & Turbón D. 2014. Ancient DNA Analysis of 8000 B.C. Near Eastern Farmers Supports an Early Neolithic Pioneer Maritime Colonization of Mainland Europe through Cyprus and the Aegean Islands. *PlosGenetics*, June 2014, doi.org/10.1371/journal.pgen.1004401.
- Frickel, S., Albert, M. & Prainsack B. (eds.) 2017. *Investigating Interdisciplinary Collaboration Theory and Practice across Disciplines*. New Brunswick, New Jersey, London: Rutgers University Press
- Frodeman, R, Klein, J. T., Pacheco, R.C.D.S. 2010. *The Oxford handbook of interdisciplinarity*. Oxford: Oxford University Press.
- Fu, Q., Rudan, P., Pääbo, S., & Krause J. 2012. Complete Mitochondrial Genomes Reveal Neolithic Expansion into Europe Svante. *PlosOne* March 2012.
- Ginzburg, C. (2012). *Threads and Traces: True False Fictive*. Berkeley, Los Angeles, London: University of California Press.
- Gowland, R.& Thomson, T. 2013. *Human Identity and Identification*. Cambridge: Cambridge University Press.
- Haak, W., Balanovsky, O., Sanchez, J.J., Koshel, S., Zaporozhchenko, V., Adler, C.J., Der Sarkissian, C.S., Brandt, G., Schwarz, C., Nicklisch, N., Dresely, V., Fritsch, B., Balanovska, E., Villems, R., Meller, H., Alt, K.W., & Cooper, A. (2010). Ancient DNA from European early Neolithic farmers reveals their near eastern affinities. *PLoS Biol*. Vol. 8 (11). Pp. e1000536.
- Hervella, M., Rotea, M., Izagirre, N., Constantinescu, M., Alonso, S., Ioana, M., Lazăr, C., Ridiche, F., Soficaru, A. D., Netea, M. G., & Concepcion de-la-Rua 2015. Ancient DNA from South-East Europe Reveals Different Events during Early and Middle Neolithic Influencing the European Genetic Heritage. *PLoS One*. Vol. 10 (6). Pp. e0128810.
- Heyd, V. (2017). Kossinna's smile. *Antiquity*. Vol. 91 (356). Pp. 348-359.
- Huutoniemi, K, Klein, J.T., Bruun, H., & Hukkinen, J. 2010. Analyzing interdisciplinarity: Typology and indicators. *Research Policy*. Vol. 39 (1). Pp. 79-88.
- Ingold, T. 1990. An Anthropologist Looks at Biology. *Man New Series*. Vol. 25 (2). Pp. 208-229.
- Ion, A. 2016. The body of the martyr. Between an archival exercise and the recovery of his suffering. The need for a recovery of humanity in osteoarchaeology. *Archaeological Dialogues*. Vol. 23(2). Pp. 158–174.
- Ion, A. 2017, forthcoming. And then they were Bodies: Medieval Royalties, from DNA

- Analysis to a Nation's Identity, in Mroziewicz, K. & Sroczynski, A. (Eds.), *Premodern Rulership and Contemporary Political Power. The King's Body Never Dies*. Amsterdam: Amsterdam University Press.
- Kaestle, F. A., & Horsburgh, K. A. 2002. Ancient DNA in Anthropology: Methods, Applications and Ethics. *Yearbook of Physical Anthropology*, Vol. 45. Pp. 92–130.
- Killick, D. 2005. Comments IV: Is there really a chasm between archaeological theory and archaeological science? *Archaeometry*. Vol. 47 (1). Pp. 185-189.
- Killick, D. 2015. The awkward adolescence of archaeological science. *Journal of Archaeological Science*. Vol. 56. Pp. 242-247.
- Killick, D. & Goldberg, P. 2009. A quiet crisis in American archaeology. *Society for American Archaeology Archaeological Record*, 29(1), 6-7 and 10.
- Kintigh, K. W., Altschul, J. H., Beaudry, M. C., Drennan, R. D., Kinzig, A. P., Kohler, T. A., Limp, W. F., Maschner, H. D. G., Michener, W. K., Pauketat, T. R., Peregrine, P., Sabloff, J. A., Wilkinson, T. J., Wright, H. T., & Zeder, M. A. 2014. Grand challenges for archaeology. *American Antiquity*. Vol. 79 (1). Pp. 5–24.
- Klein, J. T. 1990. *Interdisciplinarity: History, Theory, and Practice*. Wayne State University Press.
- Klein, J. T. 2005. *Humanities, Culture, And Interdisciplinarity: The Changing American Academy*. New York: State University of New York Press.
- Klein, J. T. 2010. A taxonomy of interdisciplinarity. In Klein, J. T. & Mitcham, C. (Eds.), *The Oxford Handbook of Interdisciplinarity*. Pp. 15-30. Oxford: Oxford University Press.
- Klevnäs, A. 2016. Deaths Matter. *Current Swedish Archaeology*. Vol. 24. Pp. 49:56.
- Kluiving, S., Kootker, L., & Hermans R. (eds.) 2017. *Interdisciplinarity between Humanities and Science. A Festschrift in honour of Prof. Dr. Henk Kars*. Leiden: Sidestone Press.
- Kristiansen, K. 2014. The Third Science Revolution and its Possible Consequences in Archaeology. *Current Swedish Archaeology*. Vol. 22. Pp. 11-34.
- Lucas, G. 2015. The Mobility of Theory. *Current Swedish Archaeology*. Vol. 23. Pp. 13-32.
- Manen, C., Perrin, p. & Guilaine. J. 2014. *La transition néolithique en Méditerranée. Actes du colloque Transitions en Méditerranée, ou comment des chasseurs devinrent agriculteurs, Muséum de Toulouse, 14-15 avril 2011*. Arles: Editions Errance 2014.
- Marila, M. 2012. Human remains as quasi-objects. *Kontaktstencil*. Vol. 47. Pp. 6–11.
- Martinon-Torres, M., & Killick, D. 2015. Archaeological theories and archaeological sciences. In Andrew Gardner, Mark Lake, and Ulrike Sommer (Eds.), *Oxford Handbook of Archaeological Theory*. Oxford: Oxford University Press, Online publication date: Feb 2015.
<http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199567942.001.0001/oxfordhb-9780199567942-e-004>.
- Mirza, M. N., & Dungworth, D. B. 1995. The Potential Misuse of Genetic Analyses and the Social Construction of “Race” and “Ethnicity. *Oxford Journal of Archaeology*. Vol. 14 (3). Pp. 345–354.
- Moran, J. 2002. *Interdisciplinarity*. New York and London: Routledge.
- Morgan, M. S. 2017. Narrative ordering and explanation. *Studies in History and Philosophy of Science Part A*. Vol. 62. Pp. 86-97.
- Morgan, M. S., & Wise, M. N. 2017. Narrative science and narrative knowing. Introduction to special issue on narrative science. *Studies in History and Philosophy of Science Part A*. Vol. 62. Pp. 1-5.
- Nelkin, D., & Lindee, M. S. 2004 [1995]. *The DNA Mystique: The Gene as a Cultural Icon*. Ann Arbor: University of Michigan Press.
- Nilsson Stutz, L. 2016. Building bridges between burial archaeology and the archaeology of

- Death. Where is the archaeological study of the dead going? *Current Swedish Archaeology* Vol. 24. Pp. 13-35.
- Omrak, A., Günther, T., Valdiosera, C., Svensson, E. M., Malmström, H., Kiesewetter, H., Aylward, W., Storå, J., Jakobsson, M., Götherström, A. 2016. Genomic Evidence Establishes Anatolia as the Source of the European Neolithic Gene Pool. *Current Biology*. Vol. 26, (2). Pp. 270-275.
- Pollard A. M., & Bray, P. 2007. A Bicycle Made for Two? The Integration of Scientific Techniques into Archaeological Interpretation. *Annual Review of Anthropology*. Vol. 36. Pp. 245–59.
- Reingruber, A., Tsirtsoni, Z., Nedelcheva P. 2017. *Going West?: The Dissemination of Neolithic Innovations between the Bosphorus and the Carpathians*. London/NY: Routledge.
- Samida, S., & Feuchter, J. 2016. Why Archaeologists Historians and Geneticists Should Work Together and How. *Medieval Worlds*. Vol. 4. Pp. 5-21. (www.medievalworlds.net)
- Spaulding, A. 1968. Explanation in Archaeology. In Binford, S. R. & Binford, L. R. (Eds.), *Archaeology in Cultural Systems*. Pp.33-40. Transaction Publishers.
- Thomas, J. 2015. Why ‘The death of archaeological theory’? In Hillerdal, C. & Siapkak, J. (Eds.), *Debating Archaeological Empiricism: The Ambiguity of Material Evidence*. Pp. 11-36. New York and London: Routledge.
- Toon, R., & Stone, L. 2017. Game of Thrones: Richard III and the Creation of Cultural Heritage A Game of Thrones. In Stojanowski, C. M. & Duncan, W. N. (Eds), *Studies in Forensic Biohistory Anthropological Perspectives*. Pp. 43-66. Cambridge: Cambridge University Press.
- Torrence, R., Rehren T., & Martínón-Torres M. (eds.) 2015. Scoping the Future of Archaeological Science: Papers in Honour of Richard Klein. *Journal of Archaeological Science*. Vol. 56. Pp. 1-248.
- Wylie, A. 2017. How Archaeological Evidence Bites Back. *Science, Technology, & Human Values*. Vol. 42 (2). Pp. 203 – 225.
- Wylie, A. & Chapman, R. 2016. *Evidential Reasoning in Archaeology*. London/New York: Bloomsbury.