

Senior Lecturer Peter Jordan
Department of Archaeology,
University of Aberdeen, UK
peter.jordan@abdn.ac.uk
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Understanding the spread of innovations in prehistoric social networks: new insights into the origins and dispersal of early pottery in Northern Eurasia

Introduction

How do technological innovations emerge and what factors enable them to disperse through complex social networks? These questions have key relevance for many academic disciplines, but only archaeology, with its central concern with understanding extended trajectories of human social transformation, can shed the light on 'deeper' histories of technological change. Rapid improvements in methods, theory, and in particular, radiocarbon and other scientific dating methods, have equipped archaeologists with a unique opportunity to compare and contrast sequences of long-term cultural development across a truly global stage.

Despite these exciting potentials, much archaeological debate can retain a rather local, if not *parochial*, flavour. In many world regions, archaeology's disciplinary history has been closely linked to the emergence of nation states, and remains constrained by an associated mosaic of modern linguistic and political boundaries. These political factors continue to structure the primary concerns of archaeological interpretation, and also influence how resources and funding are allocated to researchers practising archaeology in different parts of the globe. This enduring 'regionalism' in basic archaeological thinking remains an important problem, and can restrain archaeologists from fulfilling their true inter-disciplinary potential as 'scholars of the long term'.

In this paper I reflect on some of these challenges via a short review of research into one of the oldest problems in Archaeology – the emergence of pottery. I conclude that only a continued commitment to internationally-orientated and inter-disciplinary research of the kind supported by organisations like CAS will ensure that archaeologists look beyond established paradigms of interpretation and open out new frontiers of empirical research.

Early Pottery, Social-Evolutionary ‘Ladders’ of Progress and *Ex Oriente Lux*

Mastery of the ceramic craft has long been regarded as a crucial threshold in human technological development. In the 19th C, following the formative work of Tylor (1871), Henry Lewis Morgan included pottery-making as a distinct stage in his famous social evolutionary scheme (1877: 12–14), marking a shift from *lower barbarism* to *upper savagery*. Writing around the same time, Sir John Lubbock (1865), in *Pre-Historic Times*, started to draw more explicit links between growing crops, taming animals and the invention of pottery, all of which he argued formed the defining features of the ‘Neolithic’ (or New Stone Age). These arguments were taken up in the earlier 20th C by Gordon Childe (Childe 1925, 1929, 1957), who argued that pottery and agriculture formed part of ‘package’ of Neolithic innovations. These emerged first in the Near East, in the context of the revolutionary changes associated with the fundamentally important economic shift from a foraging- to a farming way-of-life.

Childe suggested that farming fuelled rapid population increase, creating populations larger than local environments could support, and eventually causing agricultural colonists to spill out in search of new areas, into which they carried the core elements of the Neolithic ‘package’ – farming, pottery, village-life and new forms of stone tools. Childe’s basic *ex oriente lux* model (Latin: ‘*light from the East*’) for the coeval emergence and later dispersal of pottery and farming from the Near East and into Europe was also supported by pioneering analyses of radiocarbon dates, which suggested the ‘demic diffusion’ of Neolithic agricultural populations into Northwest Europe (Ammerman and Cavalli-Sforza 1984).

While more recent debates have shifted towards addressing the degree to which the Neolithic ‘package’ was indeed spread by waves of colonising farmers, or merely adopted as a new mode of subsistence (or a new mode of thought (e.g. Hodder 1990)) by indigenous foragers, the essential validity of the *ex oriente lux* model continues to enjoy general consensus (see e.g. recent papers in Whittle and Cummings 2007; but see Gronenborn 2007:89). For most European archaeologists, pottery is still regarded as being the ‘definitive artefact of the prehistoric farmer’ (Barker 2006: 74), and as a result, its emergence in different times and places has tended to remain ‘a proxy measure of a farming economy’ without further comment (Bailey 2008: 369).

Despite this enduring consensus, several aspects of the ceramic archaeological record are particularly intriguing. First, pottery was apparently *absent* in the earliest farming societies of the Aegean and Middle East (*ibid* 2008:369). Second, and more interestingly, there is evidence that hunter-fisher-gatherers were already making very *early* use of pottery in

Scandinavia and the Baltic around 5500 cal BC, long before these communities could have come into contact with people, practices or ideas associated with the dispersal of farming. Were these northern pottery traditions an independent localised invention?

Such has been the intellectual legacy of the basic *ex oriente lux* analytical framework that these deviations from the basic model have largely been ignored, despite the fact that they hint at both a potentially important role for East European cultural connections in the story of pottery origins, as well as a more ‘complex picture of variability that raises questions about why ceramic containers were attractive in some contexts and not others’ (Bailey 2008: 369-70).

Current Research: Innovating Hunter-Gatherers and ‘Strange Noises from the East’

Increasing academic contacts with Japan, and especially with archaeologists in the former Soviet Union and China, have added further depth and amplification to these ‘strange noises from the East’, and are now forcing European prehistoric archaeologists to think outside their usual frames of reference. For example, pottery appears to have been invented by late Pleistocene hunter-gatherer communities as early as 13,500 cal BC at various locations in Far East Asia (China, Japan, and along the Amur River in the Russian Far East), and suggest that pottery in these areas was an innovation independent of plant domestications.

Recent international syntheses have started to explore the potential links between these early eastern and western early pottery chronologies (Jordan and Zvelebil 2009a (**NOTE 1**)), and preliminary results (**Figure 1**; see also: Hommel 2009) suggest that very early pottery eventually dispersed out of East Asia, across Siberia and into Northern Europe, fundamentally challenging Childe’s Near Eastern origin model. In addition, pottery may also have dispersed *through* Central Asia, where it may have been eventually taken up by early ‘pre-ceramic’ farming societies, and was then spread further into Central Europe, where it eventually went on to form Childe’s original formation of the Neolithic ‘package’ (Jordan and Zvelebil 2009b; Gronenborn 2009).

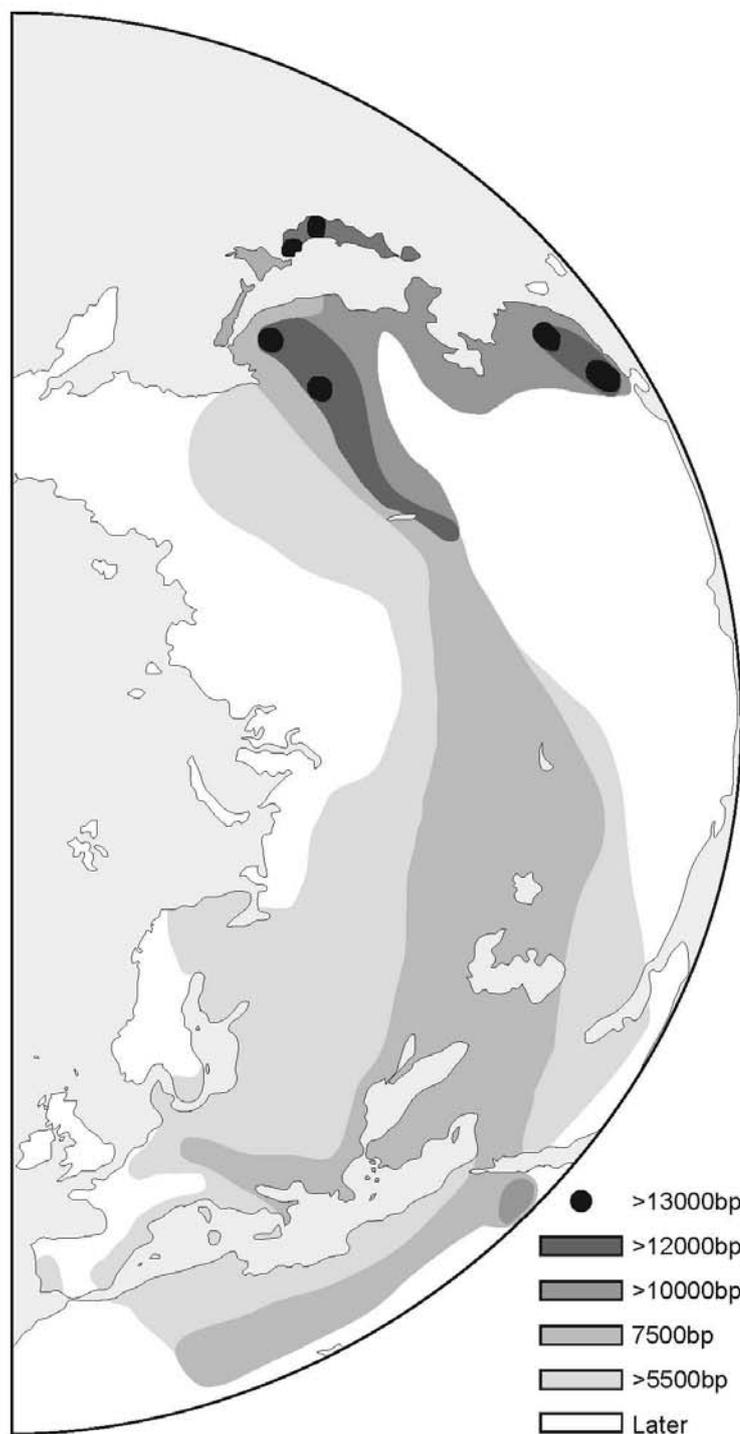


Figure 1: **Preliminary Map of Pottery Dispersal Chronologies in Northern Eurasia** (after Jordan and Zvelebil 2009b; see: Hommel 2009 for the associated radiocarbon database).

Further work will be required to trace in more detail the spread of pottery as an empirical phenomenon, but these early results already succeed in overturning the enduring archaeological assumption that pottery must be linked to a farming economy. Why, then, was pottery invented, and why was it able to spread so rapidly through the extended hunter-gatherer social networks that existed in prehistory? Recent discussions about the practical utility of early ceramic containers have drawn widely on ethnographic insights and experimental work (Rice 1999), which suggests that several factors could have made pottery vessels tremendously attractive to early Holocene hunter-gatherers (**Figure 2**, Jordan and Zvelebil 2009b).

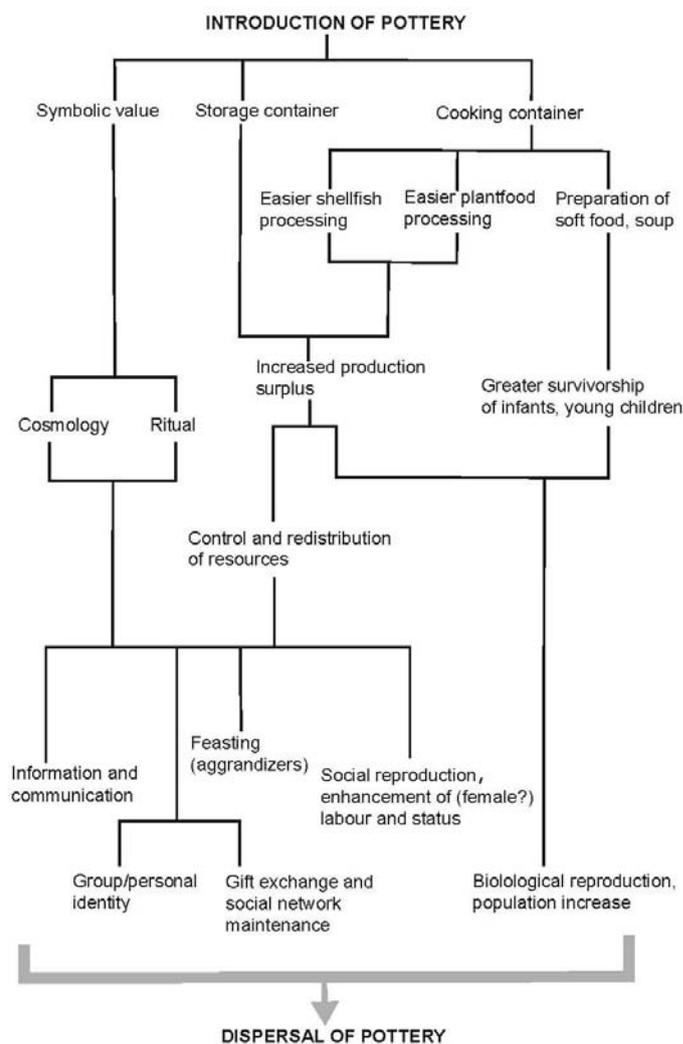


Figure 2: Initial hunter-gatherer pottery dispersal model for northern Eurasia, summarising the roles of potential social, symbolic and economic factors (after Jordan and Zvelebil 2009b).

First, in contrast to boiling baskets and other organic containers, pots are relatively 'cheap' to produce in terms of time invested, especially where there is large-scale demand (Brown 1989). They are also superb tools for the secure storage and processing of a wider range of foodstuffs, including the simmering of soft weaning foods, and can generate major improvements in diet and health, potentially fuelling rapid population growth in exactly the kinds of rich water-edge ecological niches that hunter-gatherers were starting to occupy at the start of the Holocene (Rice 1999; Jordan and Zvelebil 2009b). Second, archaeologists have also suggested that the greater productive surplus enjoyed by early Holocene hunter-gatherer societies may also have provided a new social and symbolic role for pottery as a prestige technology, which could be exploited by 'aggrandizers' to further their status and influence in highly-competitive public-feasting events (Hayden 1995, 2009).

But was the prehistoric dispersal of the new pottery technology across extended chains of communities a smooth process? Were the immense practical and social potentials of early pottery so readily apparent that prehistoric communities adopted the novel technology with little hesitation, or were more localised and strategic choices involved, such that some areas saw rapid uptake, while other communities held back? Looking behind the coarser-grained picture of general dispersal dynamics, some more localised case-studies are now starting to examine the operation of more contingent processes, rather than track a relentless spread. For example, knowledge of pottery-making only passed between communities occupying eastern and western shores of the Baltic after several millennia, despite the existence of long-term contacts and interactions, and suggesting that the choice to either adopt or reject pottery was a strategic one, perhaps somehow linked to the expression of different collective identities (Hallgren 2009); further to the north, in Finnmark, pottery was first adopted by local hunter-gatherers, but then rejected after only a thousand years (Skandfer 2009), possibly reflecting a return to more mobile life-ways that made continued pottery production difficult, or maybe linked to the death of experts or the decline of particular practical skills in these small-scale communities.

Where do we go from here? First, in breaking free from our a restrictive Eurocentric focus on understanding early pottery it is clear that we need to fundamentally re-think our assumptions that pottery must always be associated with farming. Second, the basic dispersal patterns outlined in Figure 1 indicate that we need better understandings of some basic ceramic sequences and chronologies in large parts of Eurasia. Third, as a preliminary attempt to synthesize some of the social, symbolic, economic and demographic factors that may have contributed to the spread of pottery Figure 2 is important because it underlines just how much

further work we need to undertake in order to understand some of the contexts and individual motivations that drove prehistoric pottery dispersals, and this is probably where the most interesting research and synthesis is yet to be done. For example, a new generation of biomolecular techniques (involving analysis of lipid and protein residues and isotope and trace element analysis of food crusts left on early pots) promises to identify how pots were used (Bailey 2008: 370), and a range of other cross-disciplinary methods and techniques, can enable archaeologists to shed light on how pottery was made, used and shared between forager groups, raising the potential for a large-scale comparative contextual and functional analysis of the earliest pottery traditions across key tracts of northern and eastern Eurasia.

And in shifting our analytical focus increasingly eastwards, to key early pottery sites in Siberia, Japan and China, we can note with a touching sense of irony, that Childe's original *ex oriente lux* model for early pottery origins may still be correct, though the true ceramic innovators appear to have been Upper Palaeolithic hunter-gatherers in the *Far East* and not the early farmers of Anatolia.

Note 1

Jordan and Zvelebil's international synthesis of early pottery traditions (2009a) brings together 21 fully-referenced chapters, including a full introductory essay. Together these chapters provide comprehensive coverage of early pottery traditions across the Old World, including early-ceramic dispersal dynamics and their associated chronologies.

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