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Forging networks and mixing ores: Rethinking the social landscapes of iron metallurgy

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ABSTRACT

This research explores the networks of technological knowledge that influenced changes in the iron production practices of western Uganda in the second half of the second millennium AD. Temporal and spatial variability in technological processes were observed within the research area, in terms of the style and construction of the furnaces, the use of a manganese-rich flux, and the configuration of tuyères. These shifts were considered in relation to the social dimensions of iron production, specifically the protection of technical knowledge. Informed by ethnographic data from the study area, variations were noted in the participation in, or exclusion from, iron production activity on the basis of gender and clan affiliation. This stands in contrast to ethno-historic accounts that speak of a strongly regulated production environment.

This paper considers that an uncritical emphasis on conservatism provides an inadequate framework for addressing long-term change in iron production technologies. It suggests that constellations of knowledge in western Uganda fostered the potential for innovation and experimentation, resulting in dynamic technological practice. This paper urges a more nuanced discussion of how complex metallurgical technologies transform and move within cultural and physical landscapes, with ramifications for how we conceptualize the emergence and adoption of early technologies.

1. Introduction: Variability and change in iron metallurgy

Archaeometallurgical research in Africa continues to illustrate the extensive technological diversity that dominated the pre-industrial iron smelting landscapes of the African continent (many examples to be found in Cline, 1937; Childs, 1991; Killick, 2016). This variation is far in excess of that documented in Europe, despite the much greater volume of European research that has been carried out (Killick, 2015), and yet it appears to stand in opposition to the recurring narrative in ethnographies of the rigidity and invariability of African iron production technologies. The conservatism and protectionism of technological knowledge implied in the ethnographic and ethnohistoric literature cannot satisfactorily address questions of how and why broad technological variation in the smelting record ultimately developed. Thus, this paper sets out to explore potential social influences on processes of variation and change in iron production practices, using the pre-colonial archaeometallurgy of western Uganda as a case study.

Technology can be construed as the application of knowledge (Jordan, 2015) – knowledge that is discernible within the products it creates, and the waste associated with those products. Technological change, therefore, is the process of transformations in knowledge: "a continuous, cumulative, and, largely, an irreversible process" (Parayil, 1991: 299). Seeming in contrast to this, ethnohistoric examples of African iron smelting present technologies that are tightly bound by strict behavioural and technological rules and rituals. This has often been interpreted to indicate unchanging, unchangeable technologies, especially in accounts of the early 20th century, which presented African iron smelting as "hidebound by taboo and ritual, inherently conservative with no tendency to innovate" and saw the iron workers themselves as "automaton[s] reproducing technical steps with the aid of ritual mnemonics" (Fowler, 1990: 37). Such generalisations, drawn from early ethnographic studies of African metallurgy (e.g. Cline, 1937; Wyckaert, 1914) and summarised in widely influential books (e.g. Eliade, 1956; Herbert, 1993), have permeated into more recent interpretations of the organisation of African iron production (e.g. Brown, 1995: 91[1]), and of the organisation of metallurgy in general (e.g. Giles, 2007; Roberts, 2008). However, historical analyses of pre- and post-colonial African societies illustrate their capacity for significant socio-cultural transformations in the recent and more distant past (e.g. Connah, 1998; Doyle, 2006a), which suggests that caution is required when applying the ethnographic record to archaeological data (Iles and Childs, 2014; Cunningham and MacEachern, 2016). Although

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[1] "the beliefs associated with ironworking itself make it a particularly conservative craft".

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resistance to change may be observed in individual workshops, an assumption of persistent conservatism omits the possibility of change that can occur within lifetimes, over generations or on even longer timescales. As Schmidt (1996: 4) warns, "technological histories that hold important stories of innovation and invention have been erased and replaced by representations that focus on ritual practice and beliefs surrounding iron production".

It is possible to place the preoccupation with the continuities and constants that constitute smelting 'traditions' as a tendency to overlook the dynamic nature of African society and technological capability in general (see Killick, 2015). European travellers to sub-Saharan Africa in the late nineteenth and early twentieth centuries were fascinated by ritual aspects of African life, drawn to exotic, repetitious and choreographed performance. This has arguably influenced modern anthropological and archaeological interpretations of iron production activity, [2] and it is feasible that more elaborate technological behaviours were given prominence in early accounts, overshadowing smelting activity that did not involve explicit ceremonies and rituals, and entrenching a perception of rigid and inflexible gestures and routines (see Iles, 2013a). Many iron production technologies of the nineteenth and twentieth centuries were certainly steeped in ritual, prohibitions and symbolism (see examples in Childs and Killick, 1993; Schmidt and Mapunda, 1997). However, this paper questions to what extent these elements are universal within African iron production technologies, how dynamic they were in themselves, and what time-depth can be attributed to them (see also Herbert, 1993; Chirikure, 2007; Iles, 2013a; Stahl, 2015; Mtetwa et al., 2017).

It is worth acknowledging at this point that bloomery iron smelting[3] is undoubtedly a high-risk investment activity; once a furnace is fired and a smelt is underway there is a lot at stake. Days or weeks of resource procurement and preparation culminate in a firing that could potentially fail if various requirements have not been met: too much variation from a known and accepted 'recipe' may result in economic loss for participants, or a loss of status or reputation. Access to the usual resources (including charcoal, ores and clays), furnace construction, weather conditions, the experience and energy of the head smelter and bellowers are all factors that are liable to vary from smelt to smelt, that might affect the temperature, furnace atmosphere or progress of a smelt, and which will have an impact on the outcome. Together, these considerations might indeed result in technological conservatism, especially in comparison to technologies with a lower investment of time and materials.

What role can concepts such as experimentation and creativity play within these constraints? Was there scope for individuals to experiment with these processes, stimulating invention and innovation, but also, inescapably, risking failure? Or were unintentional or unavoidable modifications the primary way by which these complex technologies changed through time[4]? The American blacksmith and anthropologist Charles Keller talks of the satisfaction gained from novelty and new ideas as a smith, but also of the satisfaction of continuity with the past – a tangible link with those who worked iron before him (Keller and Keller, 1996: 41). It may be important to note that Keller's experience is of twentieth century artist-blacksmithing communities of North America rather than African industrial metalworkers of the nineteenth century, but similar sentiments are apparent in Schoenbrun's analysis of changing engagements with shrines and spirit mediums around Lake Victoria on the cusp of the second millennium AD. Schoenbrun (2016: 216-7) asks how a community reconciles political transformation alongside maintaining fidelity to their ancestors. In both circumstances the question asks, how does traditionalism accommodate change? Where does the balance between these competing forces lie in different societies, past and present?

With these questions in mind, this paper considers the temporal changes apparent in the iron production technologies of western Uganda in the second millennium AD, in relation to different smelting communities and the 'networks of knowledge' (Kodesh, 2008, 2010) that may have linked them and influenced their technological trajectories. The research set out to explore the cultural landscape of iron smelting in western Uganda by combining archaeological, archaeometallurgical and ethnographic approaches. It identified shifts in smelting technology over time, which in turn inspired a discussion of the identity, relationships and behaviour of those who made and worked with iron. In this way, a greater understanding of how past iron production was organised in this part of the Great Lakes region can be formed, and the mechanisms of socio-economic activity that result in spatial and temporal variability in technological practice can be examined.

2. Precolonial iron production in western Uganda

This research explores these ideas of transformations in technological knowledge using an analysis of data derived from the excavation of several iron production sites in western Uganda, dating to the second half of the 2nd millennium AD. A combination of archaeometallurgical and ethnoarchaeological evidence was used to reconstruct some of the precolonial iron technologies undertaken in Mwenge – a region of western Uganda renowned historically for iron production (Fig. 1. Iles, 2011, 2013b).

This area provides a particularly interesting case study by which to discuss the movement of iron production knowledge in the wider Great Lakes region. There is little current evidence for very early iron production either in Mwenge specifically or in western Uganda more generally. This diverges from the evidence for iron smelting prior to 1000 CE in the southwest corner of the Great Lakes region (including Rwanda, Burundi, the DRC and north-west Tanzania), where evidence for early iron production stretches back to at least the mid-first-millennium BC (van Grunderbeek et al., 2001). In contrast, the earliest evidence so far for smelting in western Uganda is the furnace at the site of Munsa, dating to the fourteenth century AD and situated roughly 50 km to the west of Mwenge (Fig. 1. Robertshaw, 1997; Iles et al., 2014). It is possible that the lack of iron production remains is linked to a low population density in western Uganda prior to the second-millennium AD, with an accompanying low demand for iron (Schoenbrun, 1998; Robertshaw, 1999; Iles, 2013b), although there is scope for more archaeological research in the region to explore this further. Nevertheless, by the mid-second-millennium AD, western Uganda (and Mwenge in particular) had developed into a thriving centre for iron production, with a wide-reaching reputation for the manufacture of high quality iron: an industry that continued well into the twentieth century.

Considering western Uganda as an 'internal frontier' (Kopytoff, 1987) into which communities may have expanded through the second millennium AD provides a useful framework for thinking about how iron production might have become established in the landscape and within the social structures of the region at this time. Different groups of people would have moved into the area bringing with them different packages of craft knowledge, as well as an increasing demand for iron to clear land, hunt and farm. It is also in this later period that individual wealth – potentially augmented by producing iron – began to play an increasing role in the formation of hierarchies of power, which previously had been tied to lineage and heredity (Schoenbrun, 1998;

[2] Echoed in Sarkozy's supposition that "the African peasant only knew … the endless repetition of the same gestures and the same words" (speech given by Nicolas Sarkozy in 2007 at the University of Dakar, Senegal, quoted in Stahl, 2014).

[3] Bloomery (or direct) smelting describes the separation of iron oxides from a host ore, and their transformation to iron. A carbon-saturated, reducing atmosphere within a furnace reduces the iron oxides to iron metal. The heat within the furnace is high enough to melt the gangue (rock) minerals (which form the main part of the waste product of the process, slag), but not high enough to melt the iron: the iron remains mostly solid throughout (a bloom).

[4] Doolittle's "incremental changes" (1984) or Merton's "unintended consequences" (1936).