

**Review of: Pollard, M. A. & Gosden, Chr. (2023). An Archaeological Perspective on the History of Technology. (Cambridge Elements. Archaeological Perspectives on Materials and Technologies) Cambridge: Cambridge University Press. – 72 pages, 4 figs, 1 tab. ISBN 9781009184212.**

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I was really looking forward to this book, as a handy introduction to the earliest history of technology has long been a desideratum in archaeological research. The book is divided into eleven unnumbered sections: Introduction (pp. 1-5), “*What is Technology?*” (pp. 5-13), “*Earlier Approaches to the History of Technology*” (pp. 13-28), “*Cultural Logics and Materials*” (pp. 28-31), “*Spatial and Temporal Orders of Technology*” (pp. 31-34), “*How Does Technology Change?*” (pp. 34-43), “*Technology Transfer*” (pp. 43-52), “*Technological Choice and ‘Intentionality’*” (pp. 52-57), and “*Final Thoughts*” (pp. 57-60). A bibliography follows (pp. 61-71), and the book ends with an acknowledgement and some unpaginated pages that are blank or contain advertisement. This is only 72 pages of text (with a format of only 22.8 x 15.2 cm), but brevity needs not to be a bad thing. However, according to the current status, the publisher charges £17.00 for the paperback (about €19,25 on the day this review was written). A hefty price for the amount of text offered.

The book is intended as an introduction to a new series of texts in the Cambridge University Press. With this in mind, however, I miss many aspects of early technology, for example, a clear definition of the topic (p. 10). Moreover, it lacks significant and important new aspects of technology research, such as the whole school of sociology of technology (“*Techniksoziologie*”, e.g. MUMFORD, 1994; DEGELE, 2002), the social construction theory (“*SCT*”, BIJKER ET AL., 2012), or approaches from classical and medieval times (FRIED & STOLLEIS, 2009; POPFLOW, 2010; SCHNEIDER, 2007). In fact, there is a strong bias towards English-language publications, while untranslated French or German works are ignored. This is an odd choice, especially for an undergraduate introduction. Modern archaeological work on innovations is largely ignored (with the notable exception of a recent volume edited by Philipp Stockhammer and Joseph Maran [2017]), inter alia: BERNBECK & BURMEISTER, 2017; BRUMLICH ET AL., 2020; HANSEN ET AL., 2013, 2017-2023; KLIMSCHA ET AL., 2012, 2021; VANDKILDE, 2007. The result is a text that switches back and forth between different perspectives without

ever reaching the current state of research. For example, by pointing out that “*a key question to be answered*” would be “*whether (these) technologies predate, and thereby enable social change, or, whether they in fact follow it, and are therefore the consequence of it*” (p. 25). The question can, of course, be posed as such, but the reality is much more complex and cannot be reduced to a single, simple question. Obviously, the introduction of metallurgy had different social consequences than the introduction of new blade types, but of course diffusion was also much more complex when it occurred before or after social changes. The authors would have benefited greatly from familiarising themselves with concepts such as the socio-technical substructures necessary for technology appropriation (RAMMERT, 1998, 2007; cf. also Popitz’s [1995] “*Fundamentaltechnologien*” – fundamental technologies required for the development of other technologies), or by debating the extensive work on technology by scholars like Rogers (2007) or Ellul (1964). This is all the more strange since key figures like Leroi-Gourhan are mentioned in the bibliography, but their ideas are not considered, even where it would make sense. In fact, the authors have a very peculiar understanding of the emergence, use, and diffusion of prehistoric and ancient technologies: For example, they contrast the Palaeolithic as “*a period in which technologies were widely shared*” with the Neolithic, which is “*a mosaic of cultural forms [...] [that] produced a great range of forms of pottery, stone, domestic architecture, and relationships with plants and animals [...]. This produces a world of variability with which we are much more familiar in the present day*”. The authors qualify this statement by suggesting this dichotomy is a result of lower population density and mobility, but what I would have liked to see in such an introduction is a discussion of the ability of different groups to actually experiment with and produce technology. In prehistoric societies, there were no departments for research and development, and experimentation was not socially justified and economically motivated as in modern Western society. Thus, the question should be how change was possible at all in these very small societies where, furthermore, technology was limited to specific groups defined by gender, status and kinship? Who was able to try new things (and fail and learn), and what was their motivation? Furthermore, it must be said that the authors present here a picture that is heavily distorted by taphonomic factors: Accidental finds like the famous Schöningen spears impressively demonstrate what is missing in the archaeological record

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of the Palaeolithic (TERBERGER ET AL., 2018). The picture the authors draw of the Palaeolithic therefore seems to be based more on preserved artefacts and their distribution than on prehistoric reality. – At the very least this should be discussed in an “*archaeological perspective*” as stated in the title, since this applies to all archaeological periods.

Subsequently, the authors bring the Antikythera mechanism into play to claim that “*certain technologies can appear with no known antecedents*”, which is actually a pretty bold statement and would require further discussion, and to explain how “*a single find can completely change our perception of the past*” (p. 35). Although the Antikythera mechanism is indeed a spectacular find that does not fit into a long line of similar machines, the reviewer would have loved to hear the authors’ conclusions about how this singular find might change our understanding of ancient technology. David Warburton (2021, 28-30) has recently discussed this subject in much greater detail, showing how the Antikythera machine was based on special knowledge and why it apparently had no direct consequences. Of course, given the mixture of simplistic statements and overly detailed discussions, e.g. about the colouring of glass by the addition of antimony, makes it difficult to follow the authors’ arguments. The case studies are eclectic and clumsy and do not connect logically, making them impossible to follow. The section on “*Technology Transfer*” deserves some final words, as the authors manage to misuse a terminus technicus introduced in Roger’s famous book on innovations and intermix it with what Rogers and others call “*diffusion*”, although Rogers’s book (ROGERS, 2007) is explicitly mentioned. The authors emphasise the “*ease by which person-to-person contact can facilitate the transfer of technological know-how*” (p. 43), ignoring the fact that the archaeological record is full of evidence of technologies that did not diffuse, although other finds do demonstrate regular contact with regions where these technologies were used. The lack of mechanisms to imitate cutting-edge technology in prehistoric times never ceases to amaze modern observers: While we admire the exceptional quality of some ancient artefacts, we often cannot satisfactorily explain why certain technological changes occurred at the time they did. We might assume that the lack of socio-technical substructures and mental concepts to understand and to replicate the “*new*”, or simply the perception that existing technologies were sufficient, hindered technological development; knowledge was not free, but most likely restricted to kin-groups, that kept their know-how

secret. The lack of contact between producers and users (with the exception of military equipment) prevented effective trial and error testing of improvement innovations (cf. inter alia the papers in: KLIMSCHA ET AL., 2021). The superficial statement that “*(t)ransmissions can also be done through spoken language*” (p. 44) ignores the complexity involved in many ancient technologies as well as the often socially induced immobility of craftsmen. In fact, it is uncertain whether certain technologies could actually be spread through verbal explanations alone, glass recipes or metallurgy for instance, and how it was possible for embodied and secret knowledge to spread. Early state societies in the Late Bronze Age regularly attempted to tie craftsmen to palatial centres or even to kidnap them from other regions (e.g. WILDE, 2021).

The authors seem to imagine similar social systems from the Neolithic (sic!) to the Iron Age (this is explicitly stated on p. 44) and point out the manifold interconnections of alliances and warfare, while elsewhere they overemphasise demography and call it a “*key factor*” (p. 45). This leads to remarkably absurd extrapolations such as a thought play what might have happened if humans invented smelting 50,000 years ago, but its transmission failed because of low population density (p. 47). While failed innovations are indeed recognisable in the archaeological record, it is remarkable how knowledge diffused or was re-invented from existing know-how. The example given would have been an excellent opportunity to demonstrate how complex technologies were based on a wealth of knowledge collected over millennia, consisting of the use of copper, heating, the production of tools, the construction of kilns, and so on. I would go so far to assume that knowledge was lost on a regular basis, but since new knowledge did not appear randomly, as the authors seem to assume, similar ideas emerged elsewhere from comparable reservoirs of know-how. However, demography had only a limited impact on this, as many prehistoric technologies were shared by only few people (cf. Fried & Süßmann, 2009) or were never intended to be transferred to society as a whole. Thus, it was more likely personal networks among those with the capital to invest in experimentation or the movement of groups with specific knowledge that were responsible for the spread of knowledge, on the one hand, and the existence of suitable production facilities as well as a perceived need to acquire a specific technology, on the other, that were decisive for technology diffusion. Not just more people talking to each other.

The text is fluently written and has only a few orthographic errors (e.g. p. 17 "festshrifts"). Apart from the poor value for money, the reviewer is severely disappointed by the lack of discussion of early technologies and by the misleading conclusions. The text would have been better published as a paper in a relevant journal, where it might have stimulated fruitful discussion.

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