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The revolution that wasn't (again): reflections on the advent of lithic technology vs. AI

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To answer any question about the impact of the current 'transition' to artificial intelligence (AI) implies that we have, as archaeologists and paleoanthropologists, a good understanding of how such transitions have worked in the distant human past *and* how they had a lasting impact on the trajectory of our species' history. From that standpoint, on present evidence, I do not think that the emergence of AI is analogous either the advent of material culture or other later development like agriculture. While it is natural to ponder such things when faced with an innovation that is relentlessly hyped as revolutionary to our own way of life, we currently lack the perspective necessary to objectively evaluate the impact AI will have on human evolution.

The archaeological gaze is generally too coarse to detect the first manifestations of given behaviors or technology. In contrast, by virtue of focusing on palimpsests and time-averaged deposits, archaeology is very good at perceiving when certain innovations reached 'fixation' in their social context, what that context was, and – by looking at these phenomena diachronically – what both their roots and long-term consequences might have been. In the case of AI, we definitely lack the latter, being too close to its genesis to determine whether it will be a passing fad or whether it will mark an inflexion point in the history of our species. As for its roots, we currently lack the distance needed to distinguish it from the rapid succession of sundry technological innovations since the Industrial Revolution that have engendered fundamental qualitative changes in human life over the past three centuries (i.e., what amounts to the error range on many ^{14}C age determinations for Pleistocene contexts).

That said, there are also other qualitative differences between the advent of AI and the various behavioral 'revolutions' that are used as shorthand by specialists to indicate moments of dramatic population increase associated with a fundamental reorganization of the means of production. In ecological terms, the development of material culture in the form of stone tools fundamentally altered the hominin niche. It did so by broadening both the nutritional resources available to hominins and by reconfiguring what was considered a valuable resource on the landscape and thus what parameters could be used to navigate this landscape. That is, the earliest lithic technology clearly appears to be associated with the expansion of the hominin diet to include systematic access to animal protein (McPherron et al. 2010; Harmand et al. 2015); this set the stage for humans to become obligate tool users, meaning that our survival is contingent on tool use (see Plummer et al. 2025 for a recent review). Recent research also clearly indicates that this was a fundamental qualitative shift in hominins' ability to buffer against paleoecological variability, certainly in the Oldowan by ca. 2.9mya (Braun et al. 2025) and maybe even before with the Lomekwian. In other words, ecologically speaking, the development of chipped stone technology was both a wedge to enlarge the set of resources accessible and interesting to humans, and a trigger for further developments that would prove key to our species' evolutionary history (encephalization, colonization of non-tropical environments, etc.). So far, AI has not expanded the ecological reach of humanity and it seems difficult to imagine it doing so, costly as it is in terms of energetic, hydrological and financial resources to sustain the infrastructure needed to deploy it at scale (Crawford 2024). If anything, the rapid depletion of resources like water needed to sustain human life in other spheres imposes a concerning cost to AI that implies trade-offs that are simply incommensurate with the transformation of siliceous rocks into a new resource for humans to exploit in the context of the emergence of lithic technology.

Turning to the question of cognitive development, research over the past quarter century has unquestionably demonstrated that the neural underpinnings of lithic technology are correlated with substantial cognitive development over the course of human evolution. Specifically, over the past 3my there appears to have been net positive coevolutionary relationships between the development of lithic technology and language, complex toolmaking and social capacity (e.g., Stout et al. 2008; Wynn 2002). It is hard to compare this to the potential impact AI might have, considering that its large-scale deployment is barely three years-old. However, preliminary indications about the cognitive impacts of AI are not particularly encouraging: for instance, a recent analysis indicates that the use of Large Language Models like OpenAI's ChatGPT correlates with a decrease in learning skill in such fundamental tasks as essay production (Kosmyna et al. 2025). This suggests that some dimensions of AI may have a negative impact on human cognition, at least in some key domains of contemporary cognitive function. It strikes this author as particularly concerning that this decrease manifested itself over the span of only four months of using AI to produce essays, underscoring that what is good for AI companies (i.e., widespread uptake and usage) may not be beneficial for individual people in terms of their ability to conduct basic tasks.

Expanding the scope of this reflection to broader social issues, lithic technology has also proven to be an invaluable vector by which to understand learning and skill acquisition in the past (Bamforth and Finlay 2008). As such, the appearance of stone tools – and by extension the material culture they facilitate the creation of – indicates an acceleration over time of complexity and learning strategies. This capacity may well have built on the behavioral base seen in the innovations that can emerge from play and atypical (non-lithic) tool use among our closest great ape relatives (see Badescu et al. 2025 and sources therein). In contrast, it is difficult to envision how AI could have such structural effects on social processes. For one thing, it presupposes a certain level of competency to use (and build and maintain) computers that is at odds with the elementary learning frameworks that appear to undergird human socialization; this also restricts AI to certain segments of human societies, namely technologically-adept practitioners in WEIRD cultures (Western, Educated, Industrialized, Rich and Democratic). For another, it fosters social norms based on the wholesale exploitation of human culture with little regard to the process of *how* that culture was generated in the first place and whether or not it is correct to do so, be it in terms of intellectual property rights of whether access to some forms of knowledge can rightfully be restricted). In other words, to the extent that AI seems to promote a specific social norm, it is that of late-stage capitalism that is predicated first and foremost on extracting value from other people's labor as opposed to generating and stimulating innovations on its own.

In sum, while AI certainly holds great potential for 21st Century endeavor, it appears qualitatively different from the shift represented by the emergence of material culture as represented by stone tool over three million years ago. That said, it is also very difficult to assess AI's possible long-term evolutionary impact without the diachronic perspective that archaeology grants us to understand the impact of technological shifts over the longue durée. Preliminary data indicate, however, that the cost of AI might be much greater than its overall benefits and that what benefits it might yield are likely to be restricted to precious few members of our species.

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