



Rubina Raja & Søren M Sindbæk on...

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MACHINE LEARNING

Few with their heads less than half buried in the ancient world will have missed the spectacular recent advances in artificial intelligence and machine learning. News outlets have brimmed with stories of machines emulating complex skills that used to be the exclusive domain of humans. Even to hardened tech bosses, the development of computers that generate pictures, simulate speech, or compose essays in good English raise comparisons with the grand turns in human history. ‘Comparable in scale with the Industrial Revolution,’ said deep-learning pioneer Geoffrey Hinton to *The New York Times* in May. ‘More profound than fire or electricity,’ added Google CEO Sundar Pichai in an interview with CBS News in June. We could continue the clichés of decisive civilisational transformations with developments such as the origin of language, agriculture, or the first cities.

Much as such comparisons flatter archaeology, they raise profound concerns for many. In his recent book *I, Human: AI, automation, and the quest to reclaim what makes us unique*, psychologist Tomas Chamorro-Premuzic asks if AI can be controlled and aligned with human values to enhance our lives – or if it will turn out to fracture and dehumanise society. Similar doubts have accompanied previous technological breakthroughs in recent history: in the 1990s, when computers first outdid human grand masters in chess; in the 1980s, when complex expert systems began to aid engineers or medical doctors; or in the 1950s, when programmable computers first tempted scientists to whisper about artificial intelligence.

They could even be heard in the early 20th century, when a second industrial revolution powered by electricity and automatisations produced massive industrial cities integrated by power grids, telephones, radios, cars, automats, electric subways, and escalator-powered high-rises. The fascination with machines that might either liberate or ruin the

human world suffused culture from silent movie blockbusters (think Charlie Chaplin’s *Modern Times* or Fritz Lang’s *Metropolis*) to cabaret dance shows choreographed to mimic modish machine moves. Many wondered how human spirit and social values could survive in what was often called ‘the Machine Age’.

One of the critics most eager to learn from this artifice was Lewis Mumford, whose classic *Technics and Civilization*, published in 1934, mixed enthusiasm for new, smart technology with a critique of its impact on societies. While he believed that wisely deployed technology could bring a better world, Mumford feared that progressive mechanisations would betray human purpose, erode societies, and threaten the organic aspects of life. His advice that humans should prioritise spontaneity, emotional values, and contact with the organic world could have come straight out of any recent publication on artificial intelligence.

Mumford came to the realisation that the greatest machines of the Industrial Age were its cities – vast systems of interconnected mechanical devices for transportation, production, information-gathering, communication, and decision-making. Industrial cities delivered marvels of ingenuity and affluence, which no one could fully comprehend, but also nightmares of uncontrolled, sometimes life-consuming mishaps. Urban ‘megamachines’ took on a life of their own – like an artificial intelligence. Turning to the past for perspective, Mumford went on to write *The City in History*, a book that remains a classic in urban studies. He found ancient cities drew on the same ingenious combination of a ‘container’ of power and a ‘magnet’ for resources that he detected in the modern world.

Urban machines

Ancients were well aware of the machine-like power of cities. Take the example of Trajan’s Column, a monument that is renowned for being richly adorned with relief sculpture. It was erected at one end of Trajan’s Forum in Rome, presenting

a deliberate testament to Rome's artistic and architectural technology. Its reliefs proudly display the military technologies employed by the Romans. Yet the most sophisticated element shown is clearly their enemy's city, the Dacian capital, which was only defeated via Roman technological superiority. Just as the column displays technology's success over human strength, its images communicate the power of cities as hubs for knowledge, exchange, and control, as well as celebrating the cogs and wheels of an even greater machine: the residents of ancient Rome itself.

It was a similar perception of the cities of the Machine Age as vast, integrated circuits that inspired Mumford's contemporary, the archaeologist Vere Gordon Childe to proclaim an 'urban revolution' in the archaeological past. According to Childe, the earliest cities evolved in tandem with a revolutionary package of technologies, which included writing and craft specialisation, and which enabled humans to produce, communicate, and govern societies on a hitherto unprecedented scale.

Ancient cities incorporated a wealth of intelligent, social mechanics. Just think about the highly differing and sometimes odd topographic settings, which sometimes turn out to express a high level of technological knowledge. Zeugma, for example, was a twin city located on both sides of the River Euphrates and connected via a bridge. It flourished for centuries at the eastern edge of the Roman Empire, as expounded in Kutalmış Görkay's recent edited book *Zeugma: between two worlds*. The city's ancient name means 'bridge' or 'crossing', underlining its role connecting the two sides of this frontier river and controlling access across it. It was simultaneously



LEFT Trajan's Column, which still stands in Trajan's Forum, testifies to Rome's artistic and architectural prowess. The column element itself is not solid, but contains a spiral staircase providing access to the platform at the top of the monument. On the exterior of the column, a wealth of imagery provides a pictorial history of Trajan's Dacian Wars.

their new lords. Yet in a few generations the Umayyads managed to turn their domain into a highly prosperous province.

The Muslim settlers created new suburbs based on recognisable Middle Eastern templates, which were mostly separate from the Christians, who continued to live in the old town. The Umayyads made sure, however, to construct their new headquarters, the Alcázar, in direct proximity to the bridge, thus controlling the feature that effectively regulated all interaction

strategic, daring, dangerous, and attractive to found a city or rather two cities in such a position. The location offered so much in terms of controlling the hinterland and human mobility – and therefore the mobility of other things that travel with people, ranging from animals to ideas – that it was deemed worth taking that risk. Strategy and attractiveness won.

A similar 'smart' use of a city as a means to secure information and control is seen in Córdoba, where redevelopment in recent decades has created ample opportunities for archaeology to reveal the city's transformation from a Roman to an Islamic city after the Umayyad conquest of Spain in AD 711. As María Teresa Casal García explains in a sweeping survey *The Rabaḍ of Ṣaqunda in Umayyad Córdoba*, Córdoba's new rulers inherited extensive Roman infrastructure, including the impressive bridge, which still crosses the river Guadalquivir, together with a population of Hispano-Roman origin, who were not necessarily amicable to

across the city. With a minimum of force, they secured a role as gatekeepers for information and resources, which would have been impossible to maintain without this technology for controlling and manipulating communication in the broadest sense.

What can we humans then learn from machines in the Age of Machine Learning? First, we can realise that it is nothing new for us to use material technology to enhance our cognition, communication, and control of natural and social worlds. Before AI, items like seal stamps, tally sticks, the abacus, clocks, pulleys, or rigging were extending our capacities for gathering and retaining and communicating information, analysing data, and controlling phenomena. The most complex of all such cognitive technologies were perhaps cities. By exploring these parallels, we can use the past to put today's AI into perspective, while also using this experience to ask new questions of the ancient world. ■