

Chinese paper and inexpensive external memory

Juan Seguro

Core question

How did a lighter, flexible and increasingly producible writing material change the economics of external memory?

Historical and evolutionary context

Writing long predated paper. Clay, bamboo, wood, silk, papyrus and parchment all supported durable records in different regions. Paper emerged in China through a technological history that archaeological discoveries have pushed earlier than the traditional attribution to Cai Lun in 105 CE. Finds associated with sites such as Fangmatan and Xuanquanzhi, broadly dating to the centuries before Cai Lun, complicate any single-inventor story, although the function of the earliest fibre sheets and their status as writing paper remain debated.

Cai Lun remains historically important in later textual tradition and may be associated with improvements or official reporting, but he should not be presented as the person who simply invented paper from nothing.

What could communities know before this transition?

States and scholars could already preserve extensive written records. The limitation was material cost, weight, availability and suitability for copying at scale.

What changed?

Fibrous paper created a versatile surface that could be produced in many qualities and formats. Over centuries it became suitable not only for handwriting but also for printing, packaging and everyday uses. As production expanded, written memory could become materially cheaper and more portable.

Why could this capability emerge?

Papermaking combined knowledge of fibres, soaking, pulping, sheet formation, pressing and drying. Its development was cumulative, not a single flash of invention. Administrative and literary demand then supported expansion and refinement.

What later forms of knowledge did it enable?

Paper's significance grew when combined with bureaucracies, schools, manuscript cultures and later printing. It lowered some material barriers to copying and storing information and became a substrate for knowledge networks across Asia and, after transmission and independent adaptation, much of the world.

New limits and risks

Cheaper storage does not automatically democratise knowledge. Literacy, censorship, language, institutions and access to copying remain decisive. Paper also decays differently under different environmental conditions, biasing what survives.

What changed in the architecture of human knowledge?

External memory became **lighter and potentially cheaper per copied unit**. The storage layer of knowledge could expand without a proportional increase in the mass and cost of its physical substrate.

Loss, exclusion and uncertainty

The search for a single inventor obscures archaeological evidence and workshop traditions. The chronology of the earliest paper and proto-paper remains debated because not every early fibre sheet was necessarily used for writing.

Dependency map

- PARALLEL ← PIO-014 Cuneiform accounting, writing and external memory
- PARALLEL ← PIO-016 Laws, contracts and institutional memory
- DIRECT → PIO-037 East Asian printing and knowledge multiplication

- INDIRECT → PIO-044 Renaissance humanism, perspective and printing

References

1. Drège, J.-P. *A Short History of Paper in Imperial China*. De Gruyter (2024). <https://doi.org/10.1515/9783110701593>
2. Drège, J.-P. Les débuts du papier en Chine. *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres* 131, 642–652 (1987). <https://doi.org/10.3406/crai.1987.14537>
3. Tsien, T.-H. *Paper and Printing*. In Needham, J. (ed.), *Science and Civilisation in China*, Vol. 5, Part 1. Cambridge University Press (1985).