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Olivier Morin

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# 1 The piecemeal evolution of writing

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3  
4 Olivier Morin

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7  
8 Max Planck Institute for Geoanthropology  
9 10, Kahlaische strasse, 07745 Jena, Germany.  
10 Institut Jean Nicod, CNRS, ENS, PSL University  
11 29, rue d'Ulm, 75005 Paris, France.

12 [morin@shh.mpg.de](mailto:morin@shh.mpg.de)

13 ORCID: 0000-0002-6216-1307

14  
15  
16 **Abstract.** This paper argues that writing evolved gradually and in piecemeal fashion. Literacy  
17 as we know and use it is made up of at least three distinct features: it is a glottography (a  
18 notation of language), it is a generalist code that can note down anything we can say, and it is  
19 a form of asynchronous communication—a way of conveying information to other people  
20 across space and across time. This combination of features is uniquely powerful; but this does  
21 not mean the three features evolved together, or for the same reasons. Glottography,  
22 generality, and asynchronous use evolved out of pace with one another. Two huge lags  
23 separate, first, the invention of glottography from its generalisation beyond proper names,  
24 second, the existence of writing as a generalist tool from the routinisation of its asynchronous  
25 use. At each step the inventors of writing responded to distinct and specific pressures. The  
26 originators of glottography were not necessarily aware of their invention's potential beyond  
27 the notation of proper names. Those who developed writing into a generalist tool, capable of  
28 encoding anything that can be said, were unlikely to anticipate that the code they were using  
29 as an accompaniment to oral recitations, or as a reminder of the transactions they took part in,  
30 would come to be used in a quite different way—to store information for the benefit of distant  
31 recipients to whom the information would be new.

32  
33 **Keywords:** Literacy; Cultural evolution; Proper names; Asynchronous communication;  
34 Archives.

## 35 36 1. Did writing evolve?<sup>1</sup>

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38 Did writing evolve? The question may seem trite, or empty. Of course, writing had  
39 forerunners. It did not appear overnight. But if we ask how gradually the notation of language  
40 emerged from the graphic symbols that preceded it, we may not always get a straightforward  
41 answer. One of the most authoritative books on the origins of writing (Houston 2004)  
42 provides two opposite answers from two different authors. Stephen Houston (Houston 2004:  
43 5–6) claims that the evolution of writing was abrupt by archaeological standards, occurring  
44 over one generation at the longest. Houston is hardly alone in making this claim, echoed by  
45 other important work on the subject (DeFrancis 1989: 74). But Houston’s book also hosted  
46 Bruce Trigger’s contribution, which pushed the claim that writing acquired only gradually the  
47 capacity to encode language (Trigger 2004). The nearly twenty years that have elapsed since  
48 this work do not seem to have quite dispelled the ambiguity.

49  
50 The community has several reasons to be wary of an evolutionary view of writing—some of  
51 them good, some bad. One of the good reasons is the rejection of the evolutionism that  
52 pervaded early work on writing such as Diringen (1953) or Gelb (1963). Evolutionism, as  
53 these authors defended it, was a linear scale of progress guiding civilisation from pictographic  
54 communication to hieroglyphs and on to the pinnacle of alphabetic literacy. This kind of  
55 evolutionism is closer to Spencer than to Darwin; it has been rightly criticised for arbitrarily  
56 valuing some ways of writing above others, and for overstating how continuous and one-  
57 directional cultural change could be.

58  
59 A second argument could be that one cannot half-invent writing. Writing is usually defined as  
60 a glottography<sup>2</sup>, that is to say, a notation of language, or a code that links its letters to the  
61 sounds of the language that it encodes. Ideographic or pictographic systems, which represent  
62 ideas or things directly, bypassing words, are not counted as writing proper (see Morin 2022  
63 for a review of this idea). If we take this view, then the discovery of writing coincides with  
64 the discovery of the glottographic principle: the idea that one can inscribe anything that one  
65 may say, just by noting down the sounds of language. Once the glottographic principle is  
66 invented, it offers the possibility to encode a broad range of content with graphic symbols.  
67 From the moment people realised that pictures could convey sounds, using either acrophony  
68 or the rebus principle, they became virtually capable of applying the glottographic principle to  
69 any verbal message, even if they did not use this capacity.

70  
71 This argument leaves out two important aspects of writing. These aspects are not implied by a  
72 strict definition of writing understood as the glottographic principle; this makes them no less  
73 difficult to ignore.

74  
75 The first property is generality. Glottographic writing, as we use it today, is used pervasively  
76 and for a broad range of purposes. There are things that writing systems cannot easily encode,  
77 for which other graphic codes are preferred—emojis, musical notations, airport signs, etc. But

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<sup>2</sup> In this paper I will use the adjective “glottographic” and “phonetic” interchangeably. In doing this I am glossing over a subtle distinction between glottography—the notation of language—and phoneticism—the notation of sound. I elaborate on this distinction elsewhere (Morin 2022), but for the purposes of the present argument, it may be left aside without much damage.

78 in literate societies today, the vast majority of graphic communication (that is to say, the use  
79 of permanent marks to encode information) involves glottographic writing. Still, glottographic  
80 writing was not always generalist in that sense. Yes, it can be argued that glottographic  
81 writing always had potential for generalist use—that glottography is a general-purpose  
82 graphic code *in nuce*. Yet this potential can remain untapped. Section 2 will review evidence  
83 that glottographic writing remained, for centuries after its invention, almost exclusively a tool  
84 for transcribing proper names. I will briefly speculate on the reasons for the link between  
85 glottography and proper names encoding, arguing that the received explanation for this link is  
86 deficient.

87

88 The second property is asynchronicity: the capacity to use a written message to convey a  
89 novel piece of information across time or space, to someone who does not already know it.  
90 Uses of writing that lack asynchronicity include mnemonic uses, where writing acts as a  
91 memory prop to help someone remember information they have already partly memorised.  
92 Also lacking asynchrony are messages that do not make sense without an oral gloss provided  
93 by an interpreter already acquainted with their meaning. Section 3 will review the evidence  
94 showing that purely asynchronous communication is a late and relatively rare development in  
95 the history of glottographic writing. Direct evidence consists in texts explicitly describing  
96 literacy as used chiefly for recitational purposes. Indirect evidence can be gathered from  
97 studying two conditions that have to obtain for writing to make asynchronous communication  
98 possible. Asynchronous communication requires texts that are self-contained (readily  
99 understandable out of context), as well as easy to consult and retrieve. I will argue that ancient  
100 texts were generally difficult to process asynchronously. Their content was not explicit  
101 enough; their storage and archiving were haphazard.

102

103 Together, these claims sketch a picture of writing’s evolution where the key features of  
104 literacy evolved out of synch with one another. Glottography comes first, but for centuries the  
105 possibility to organise a generalist communication tool around it remains neglected. The use  
106 of writing for asynchronous communication was even longer in becoming routine.

107

## 108 **2. Why did writing start as a mere tool for encoding proper names?**

109

110 The first stumbling block in the history of writing was hit immediately after the invention of  
111 phonetic encoding—in some places at least. Some literate cultures, having found and applied  
112 the glottographic principle, used it to write down proper names, and stopped there—  
113 sometimes for generations, sometimes for ever.

114

### 115 **2.1. Glottography was invented to encode proper names**

116

117 There is a tight connection between the glottographic principle and the encoding of proper  
118 names—names of people, places, institutions, or lineages. This connection played a crucial  
119 role in decipherment, since the same proper names could be encoded by different writing  
120 systems, thus serving as a test case for the decipherers’ hypotheses. All the documented

121 ancient inventions of writing, in Egypt, China, Mesoamerica, Sumer, and (if secondary  
122 inventions are included) Anatolia, start to notate at least some proper names phonetically as  
123 early as they acquire the capacity to encode sounds, usually through the use of acrophony or  
124 the rebus principle (Valério & Ferrara 2019). This is not true for most other parts of speech:  
125 verbs, adverbs, adjectives, connectors, etc. Put differently, glottographic graphic codes are  
126 always capable of encoding the parts of speech that designate particular people, institutions,  
127 or places. But the capacity to encode actions, the aspects or locations of things, or syntactic  
128 relations, is optional and emerges later, if at all.

129  
130 *Egypt.* The first manifestations of phoneticism in Egyptian writing occur for the notation of  
131 proper names (of persons, places, or institutions), in sources such as Tomb U-j in Abydos, c.  
132 3200 BC (Stauder 2010; MacArthur 2010; Baines 2007). Only much later do continuous  
133 sentences start being written down (in the Third or Fourth dynasty, i.e., after 2600 BC—  
134 Baines 2007: 39). Lengthy texts such as letters arrive even later (Baines 2007: 100, 128, 143).  
135 The lag is all the more striking since many Early Dynastic proper names consist of short  
136 sentences or noun phrases with a transparent semantics (e.g., “Horus the fighter”, “He who  
137 brings the water”). In other words, the users of the writing system already had the resources to  
138 encode much linguistic material beside proper names; but for a long time, they did not.

139  
140 *Mesopotamia.* Here again the invention and perfecting of the phonetic principle occurred first  
141 for personal names notations, c. 3000 BC (Gelb 1963; Schmandt-Besserat 2007); here again,  
142 the potential of phoneticism for encoding language beyond proper names remained untapped  
143 for centuries after its discovery. Grammatical affixes, for instance, do not appear to be  
144 encoded in writing until around 2800 BC (Cooper 2004). There is an even longer wait until  
145 continuous writing, encoding full sentences, starts to replace tabular writing (Nissen et al.  
146 1993; Schmandt-Besserat 2007; Maiocchi 2019), and yet another lag before the appearance of  
147 long texts such as royal inscriptions or letters (Cooper 2004).

148  
149 *Meso-America* provides yet another clear case of glottography being tied to proper name  
150 encoding. Early Mesoamerican writing, such as the first Maya writing inscriptions on the  
151 murals of the San Bartolo site (c. 400–200 BC) or the Olmec inscriptions of the first  
152 millennium BC, as far as we can tell in the absence of decipherments, used phoneticism  
153 (when they used it at all) to encode proper names (of persons, including their ranks, and  
154 deities), and the names of calendrical days (Justeson and Mathews 1990; Palka 2015). As for  
155 the Aztec writing system, not only does its use of the phonetic principle start with proper  
156 names encoding, it seems never to have been applied beyond proper names (Whittaker 2018).

157  
158 *China* is the least clear of all four cases, due to the fact that Chinese writing appears in the  
159 archaeological record at a stage where the technology is already quite sophisticated and  
160 versatile. It is possible that seal emblems and Shang bronze vessel inscriptions represent a  
161 phonetic writing system, in which case the Chinese case would present a fourth case where  
162 the origins of phoneticism are linked with proper name encoding (Boltz 1993).

163

164 These examples suggest that phonetically encoding proper names is a constant feature of  
165 glottographic writing: all glottographic writing does this, and some glottographic writing does  
166 little else. Note that the kind of writing which uses phoneticism for proper names, but for  
167 nothing else, should still count as full writing, since it has the capacity, in theory, to encode  
168 anything that may be said in the target language. Names in many languages often consist of  
169 repurposed noun phrases or even full sentences (as we just saw with Egyptian). Nahuatl  
170 names, transcribed by the Aztec writing system, often consist of complete sentences. The  
171 Aztec writing system was capable of encoding names like *Xihuitltemoc*, a proper name  
172 translating as “A meteor has descended” (Whittaker 2018). It could easily encode similar  
173 phrases that are not proper names; but it did not. As we saw, Aztec writing is just an extreme  
174 example of a general trend: incipient writing systems remained restricted to a name-encoding  
175 function, sometimes for centuries.  
176

## 177 **2.2. How are proper names and glottography connected?**

178

179 Why do glottography and proper names have this special link? The standard answer goes  
180 roughly this way. Proper names, compared to common nouns (like “tree”, “water”, “bushel of  
181 wheat”, etc.) are difficult to represent iconically—that is to say, with motivated signs which  
182 resemble what they refer to. This prompted the inventors of writing to use phonetic shortcuts  
183 to encode proper names. This explanation is deficient for two reasons. First, many parts of  
184 speech are difficult to encode iconically: abstract words, conjunctions, prepositions, adverbs,  
185 etc., are also quite tricky to figure with pictographs—and yet glottography was not invented  
186 for them. Second, there are in fact many easy ways to represent proper names graphically  
187 without going phonetic. Heraldry is the clearest case, although there are many others.  
188 Heraldic codes represent individuals, lineages, clans, or institutions (including countries,  
189 cities, etc.) using abstract or figurative pictographs. The global flag system, or global  
190 commodity brands, are familiar example; European and Japanese family crests are the best  
191 documented historically (Morin and Miton 2018). The city emblems displayed on the coins of  
192 ancient city states share many of these properties: they often sufficed to identify the issuing  
193 city, without any other indication (Pavlek et al. 2019). Closer to the invention of writing,  
194 Mesopotamian or Egyptian seals or brands were often purely pictographic, altogether lacking  
195 in written inscriptions (Pitman 1994; Wengrow 2008). All these systems of marks encoded  
196 the identity of a person, a clan, or a place, without encoding sounds.  
197

198 (Here, it might be objected that the rebus principle was often used in heraldry, usually in the  
199 form of visual puns (Pastoureau 2007). This is especially true for European heraldry, where a  
200 family name would sometimes be represented in this way—for instance, the arms of the  
201 Bowes-Lyon family sport bows and a lion (“canting arms”). This use of the rebus principle  
202 falls short of full glottography, however, because it was quite unsystematic. There was no  
203 codified constraint dictating that it should be used constantly, and in specific ways. Several  
204 distinct visual puns could encode the same sound, which could also be indicated without  
205 recourse to the rebus principle.)  
206

207 To summarise, the graphic notation of proper names does not require a phonetic encoding;  
208 and even if it did, proper names are not the only parts of speech that can be conveniently  
209 represented in this way. How then do we explain why phonography would be restricted to the  
210 encoding of proper names?

211  
212 My favoured answer is that proper names, compared to other linguistic expressions, are  
213 difficult to decompose into basic morphological, syntactic, or semantic components  
214 (Langendonck and Velde 2016). A phrase like “the woman in the sky-blue pullover” can be  
215 decomposed into syntactic and morphemic components, whose meaning can be defined. But  
216 the name “Patricia Paige Smith”, beyond the decomposition between first, middle, and last  
217 name, lacks an internal morphological or semantic structure. An ideographic notation may  
218 succeed in encoding “the woman in the dark green cargo pants” with a series of pictograms  
219 (e.g. [woman] + [dark + green] + [cargo + pants]), each of which might be understood on its  
220 own. Encoding “Patricia Paige Smith” with ideographs cannot be done in the same way,  
221 because words like “Patricia” lack the kind of internal structure that is readily found in other  
222 parts of language<sup>3</sup>.

223  
224 Two basic solutions are possible: either to create a specific, idiosyncratic graphic identifier  
225 that refers to the individual Patricia Paige Smith, or to encode the phonemes of her name (/p/,  
226 /a/, /t/, etc.). The first option comes with a mnemonic burden: one needs to learn as many  
227 symbol-person associations as the number of proper names one needs to encode. The second  
228 option, phoneme-encoding, does away with this constraint. One only needs to remember  
229 graphic signs for a limited number of phonemes, making it possible to encode a vast range of

---

<sup>3</sup> This answer needs to contend with an obvious objection, raised by one of this article’s reviewers. Proper names in many languages can be formed from phrases that are quite transparent—as we just saw in the case of Egyptian or Nahuatl, among others: “A meteor has descended” (*Xihuitltemoc*), “Small sandal” (the nickname *Caligula*), “Sitting Bull” (*Thátháŋka Íyotake*), or “Fight the good fight of faith” (a religious hortatory name the kind of which New England Puritans were partial to). It is obvious that they derive from natural language phrases that can be decomposed at multiple levels. This seems to contradict what I just wrote. Even a seemingly opaque name like “Patricia Paige Smith” is based on words that have (or used to have) a precise meaning: “Smith” is someone who works with metal, “Patricia” is the feminine of *Patricius* (nobleman)<sup>3</sup>. This, however, is not relevant to the meaning of “Patricia Paige Smith” as a proper name. The word “Smith” in Patricia Paige Smith does not mean “someone who works with metal”, just like “Caligula” does not mean “small sandal”. The name *Smith* and the substantive *smith* should be treated as cases of polysemy: two words with a shared history but completely distinct meanings. “Smith” simply means the proper name Smith. In this respect it is just as opaque as any other last name. Likewise, to gloss “Patricia” as “noblewoman” does not tell us anything about its meaning in the context of the name “Patricia Paige Smith”. One cannot translate “Patricia Smith” as “Noblewoman working with metal”—this does not in any way help convey the meaning of that name, which is the identity of the person it refers to.

230 proper names with a very limited set of signs. This crucial advantage of the glottographic  
231 principle applies far beyond proper names, but it is especially useful when applied to them,  
232 because of their relative opacity and lack of structure.

233

234 Yet, as we just saw, the ideographic option is by no means impossible, and it is widely  
235 practiced in pictographic communication. How then can the memory burden be sustained?  
236 Two things lighten it. First, even though proper names typically show less morphological  
237 regularity compared to the rest of the lexicon, this varies. The name “Count Alexey  
238 Kirillovitch Vronsky” can be decomposed as two personal identifiers (Alexey and Kirilov), a  
239 suffix indicating that Alexey is the son of one Kirilov, and an aristocratic title. Morphological  
240 expressions like the suffix “-ovitch” may be encoded with one invariable graphic device,  
241 which can be re-used for other individuals. Second, the use of ideographic emblems does not  
242 require one person to know how to produce the emblems of many individuals. An emblem  
243 tends to be produced mostly by the person it identifies (or members of their household), to  
244 sign documents, mark possessions, etc. Others merely need to recognize this emblem, not to  
245 produce it. For complex graphic symbols, recognition memory is much less demanding than  
246 production memory. Our production memory for many everyday symbols is notoriously  
247 deficient: most Americans would not know how to reproduce, without looking, the design of  
248 the US one penny coin (which side does Lincoln face?) (Nickerson and Adams 1979). This  
249 does not prevent those symbols from carrying information. Not only are emblems  
250 memorisable, they may also encode information that proper names miss. A coat of arms may  
251 encode genealogical ties or marital relationships, etc., which proper names or titles do not  
252 necessarily reflect. A national flag can carry religious or political symbols going beyond the  
253 state’s name. This goes some way towards explaining why emblems may be preferred to  
254 glottographic notations, even in literate societies, at least for certain uses (Pim, Yatsenko, and  
255 Perrin 2010).

256

257 We should thus expect ideographic personal emblems to be the option of choice in relatively  
258 decentralized systems where each individual need only know how to produce their own  
259 emblem, and recognize those of other individuals of interest (not necessarily many of them).  
260 Conversely, we should expect glottographic encodings to arise when a limited group of  
261 people take up the task of producing documents that encode a broad variety of names. The  
262 communicative needs that led to the invention of glottography appear to have been quite  
263 specific to the encoding of proper names, under very specific circumstances. Nothing about  
264 proper names demands a glottographic encoding in all circumstances—numerous systems of  
265 emblems attest to this. The rise of glottography thus occurred in response to a rather specific  
266 need—the need for a small group of people to remember and produce a large number of  
267 emblems, if my speculations are on the right track. Once this single function was fulfilled, no  
268 further step seems to have been taken for centuries.

269

### 270 **3. Asynchronous communication: Getting a message across space and time**

271

272 A second major property of writing arguably evolved gradually, and later than glottography:  
273 pervasive asynchronous use. The possibility of asynchronous use is a crucial feature, not just  
274 of writing, but of graphic codes in general (Morin *et al.* 2020). To communicate  
275 asynchronously is to transmit information to someone else across time or across space (often  
276 both), without a human intermediary. Until the advent of recent inventions (irrelevant to  
277 archaeologists), graphic codes were the only reliable means of achieving that. Yet graphic  
278 codes are not always used in this fashion. On the contrary, some graphic codes serve to  
279 communicate in a way that is almost exclusively synchronous. Pictographies used as  
280 repositories for incantations assist shamans in reciting chants that they have in large part  
281 already memorised (Severi 2019; Hoffman 1888; Déléage 2013). The audience for these  
282 chants (who may not always understand or pay attention to them) does not gain information  
283 directly from the pictographs, but from the shaman; the shaman themselves can only make  
284 sense of the pictographs because they have memorised the chants that the pictographs  
285 encode—chants that they know either by personal invention or from oral transmission. This is  
286 but one example of a very general phenomenon: graphic marks may be used as memory props  
287 to help remember speeches that have been orally transmitted, rather than communicate a  
288 novel piece of information to someone not already in possession of it. Aside from shamanic  
289 chants, historical records (Mallery 1886), missives, even shopping lists (Croft 1949), could be  
290 encoded pictographically, but only if their content was also memorised.

291  
292 There is, in other words, no automatic link between the presence of a graphic code in a given  
293 culture, and its capacity to sustain communication across long distances of time or space. A  
294 society that masters a complex graphic code does not *ipso facto* become able to engage in  
295 remote trade, in epistolary correspondence without intermediaries, or in the maintenance of  
296 elaborate archives.

297  
298 What does glottography change about this? In theory, it could change a lot; in practice, it may  
299 have changed nothing at all. The potential of writing for asynchronous communication may  
300 remain untapped for centuries, if not more. The fact that writing can be used to communicate  
301 asynchronously across space and time, doing away with the constraints of orality, is what  
302 makes it precious to us today. But how can we gauge the extent to which writing, once  
303 developed, was used for asynchronous communication? Reconstructing the past uses of a  
304 graphic code in a remote era is a tall order: most of the evidence has to be indirect or  
305 retrospective. The challenge is to show that messages were accompanied by oral recitations,  
306 or that they reminded the reader of content that had already been memorised, as opposed to  
307 conveying novel information to a novel person without the support of an oral gloss. Two  
308 kinds of evidence can be mustered in favour of this view.

### 309 310 **3.1. Evidence that early written communication was synchronous**

311  
312 Direct evidence can be obtained when a text directly mentions the fact that this text, or texts  
313 like it, are made for synchronous communication. Two kinds of synchronous uses should be  
314 singled out. On the one hand, many ancient literary genres were inseparable from an orally  
315 learnt and orally sustained art of memory (Carr 2005). This is a synchronous use of writing

316 because the text does not, by itself, convey novel information to novel recipients: it serves as  
317 a memory prop for someone who is already supposed to know the content (difficult though it  
318 may be to recall it without the prop). This use of writing is what Eric Havelock (1977: 372)  
319 described as “recitation literacy”, characterising societies where

320

321 “the skill [of literacy] is one of decipherment rather than fluent reading. The use of the  
322 written word is very restricted, and any reading of it is regarded as ancillary to the  
323 central function of culture, which is (...) to recite and memorise (...).”

324

325 Direct evidence of recitation literacy comes from explicit mentions of memorisation being a  
326 mandatory part of a literate curriculum, and the most valued one. Such mentions are abundant  
327 in the Mesopotamian, Jewish, and Hellenistic literate traditions (Carr 2005). Greek epic  
328 poetry or Biblical texts are the most prototypical example of literary genres whose  
329 transmission relied extensively on oral tradition even after they had been written down for  
330 centuries.

331

332 Other genres are based on synchronous use because they consist of documents designed to  
333 accompany a face-to-face oral interaction, which they describe. A clear example of this is a  
334 letter that mentions the fact that it is being read aloud by a messenger (a ubiquitous practice,  
335 abundantly documented: see e.g. Wearne 2021; Stock 2012). By itself the practice of reading  
336 aloud does not mean the messenger is reciting a partly memorised text (although, in a culture  
337 otherwise dominated by recitation literacy, that would be likely); but it does mean that the  
338 audience gains access to the novel information conveyed by the letter through oral means, not  
339 directly through writing. Another family of documents that bear the mark of mostly  
340 synchronous use consists in all the texts that record a ritual after it took place, or make plans  
341 for the performance of a ritual. One example among others: the texts written by the scribes of  
342 Babylonian and Assyrian kings to plan for the ritual conclusion of an alliance between  
343 sovereigns (Charpin 2019). In most of these texts, the written word served to note (usually in  
344 draft form) the oaths that were to be pronounced publicly by a sovereign and his messenger  
345 (acting as a stand-in). Evidence that most of these texts had no use but that of script for a  
346 ritual interaction is given by the fact that alliance oaths did not have to be written down in  
347 order to be valid, that alliances concluded by the two kings meeting “live” in the same  
348 location were not usually written down, and that the transcription of the oaths on durable  
349 material fit for public display and long-term archiving was far from systematic.

350

351 The kind of direct evidence for synchronous uses of writing that was just listed is only  
352 available for texts that are elaborate enough to inform us about the conditions of their own  
353 use. This is hardly always the case for early written documents. The conditions of their use  
354 must then be inferred based on indirect cues.

355

### 356 **3.2. Decontextualisation and storage: Two preconditions of asynchronous** 357 **communication**

358

359 Two things at least seem required for a text to be legible, out of its context of production, by a  
360 reader not already acquainted with its content.

361

362 *Decontextualisation:* The first ingredient of asynchronous communication is information  
363 supplied by the text itself: any piece of information that a text contains is information that  
364 does not need to be supplied by the reader's memory, or by an oral gloss. A message is self-  
365 contained to the extent that it can be understood with little such contextual information. Self-  
366 containment is a matter of degree, not an all-or-nothing property. Linguists have argued for  
367 the existence of a trade-off between the information that is contained within a message and  
368 that which context supplies (Wray and Grace 2007; Winters, Kirby, and Smith 2018).

369 Registers of speech vary on this dimension: loose speech encodes less information and leaves  
370 more to context than sustained speech, which tends towards the explicit and the copious. (It  
371 has been suggested that entire languages can be sorted along this dimension, some being more  
372 suitable for decontextualized communication than others—Trudgill 2011; Winters, Kirby, and  
373 Smith 2015.) Asynchronous communication is impoverished communication, in that it lacks  
374 contextual cues that can only be provided in a face-to-face setting (Morin, Kelly, and Winters  
375 2020). Written texts make up for this by being more explicit and self-contained than speech  
376 would be. Not all written texts do this, to be sure, and some registers of speech can be highly  
377 decontextualised too. Legal or political discourse in complex societies come to mind; in  
378 small-scale societies too, we find genres of formal speech fit for a relatively broad and  
379 impersonal audience (Bloch 1975). Nonetheless, the need for decontextualization is likely to  
380 be greater, all else being equal, if a message is to be communicated asynchronously.

381

382 *Storage:* The second ingredient is the possibility for readers to consult the texts that are  
383 relevant to them, after the time they were produced, or away from the place where they were.  
384 From the time it is produced, an asynchronous message is in danger of being lost to its  
385 recipients—through material destruction, misplacement, or forgetfulness of its location. Using  
386 writing successfully for asynchronous communication requires making sure that texts survive  
387 long enough to be consulted (durability), as well as storing them in accessible and reliable  
388 repositories, or alternatively ensuring their delivery to relevant recipients (retrievability). A  
389 simple if expensive way of achieving this is monumentality: an inscribed stela is permanent  
390 and conspicuous enough to be easily read by anyone literate. Yet another way to make writing  
391 work asynchronously are archives, understood as the organised, permanent storage of  
392 documents. Without solutions like these, a written message that is easily destroyed or readily  
393 misplaced cannot be used many times to impart new information to someone not already  
394 acquainted with its content. It can still be used to impart information, but only on a limited  
395 number of occasions, in conjunction with oral glosses, or as a mnemonic prop.

396

397 Self-contained texts and organised archives: these two things are preconditions for the  
398 asynchronous use of writing, but they do not constrain the development of writing, if writing  
399 is understood as a generalist, glottographic code. Self-contained texts and organised archives  
400 determine to what extent written texts can be used autonomously, that is to say without the  
401 intermediation of an oral gloss, without a great deal of contextual knowledge, without pre-  
402 existing memorised knowledge of the text's content. But writing, when it first evolved, was

403 not usually put to this kind of use. Some authors have argued for a strong connection between  
404 writing and the storage of decontextualised information (e.g. Goody 1977). Here, I take the  
405 opposite view.

406

407 *Making texts self-contained*

408

409 How self-contained were messages? How easily consulted? Answering the first question  
410 requires us to know how difficult it is to make sense of a piece of writing taken out of its  
411 context of production. Palaeographers and archaeologists are in the best position to know how  
412 difficult this can be. They also know how much the answer varies depending on sites, periods,  
413 and types of material. Still, we can find a general basis for comparison in the length of texts.  
414 All else being equal, a longer text contains more information than a shorter one; length may  
415 thus be a proxy for the degree to which texts were self-contained or self-interpretable. As far  
416 as I know, no general comparative study of text lengths across areas and time periods has  
417 been pursued, and doing so on a document-by-document basis would no doubt raise daunting  
418 technical difficulties. However, if we consider the genre of early written documents, and ask  
419 which kind of text tends to evolve first, the answer seems relatively clear. Some genres are  
420 inherently limited in length or in content, while others are much more conducive to  
421 comprehensive, self-contained messages. A cartouche used as label, a seal inscription, an  
422 inscription marked on a drinking vessel or a postherd, are intrinsically short. Their extreme  
423 concision suggests that such notes only carried little information by themselves, and could  
424 only be made sense of in a very precise context, by people who knew something about the  
425 relevant interactions underlying it. In contrast, full letters, chronicles, epic poems, or  
426 legislative compilations, are much easier to understand on their own: they just contain more  
427 information.

428

429 Looking at the four areas where a pristine invention of writing occurred, not one of them  
430 shows full letters, chronicles, or legislative compilations appearing earlier than shorter genres  
431 like pottery inscriptions, seals, or identifying tags. In Egypt the priority of identifying tags and  
432 pottery inscriptions is clear (Baines 2007). Likewise, in Mesopotamia, accounting tablets  
433 predate documents such as letters, narratives, or legal texts, by centuries at least (Nissen et al.  
434 1993; Maiocchi 2019). Lexical lists, which can be fairly long, are the sole exception to this  
435 pattern, arising shortly after accounting documents (Watson 2013; Wagensonner 2010), and  
436 no one doubts that they were used as mnemonic tools, not as ways to impart novel  
437 information by writing alone. The Mesoamerican data follow the same pattern, showing only  
438 very brief texts (always less than a few hundred signs, except for some late Maya  
439 inscriptions—Justeson and Mathews 1990). As for China, its written record emerges fully  
440 armed (so to speak) from the archaeological record, with Shang oracle bone inscriptions  
441 already providing lengthy and self-contained narratives; the contention that the emblems  
442 found on earlier bronze vessels were an ancestor of Shang inscriptions would, if true, validate  
443 my claim, but it is unclear whether these constitute writing in the proper sense (i.e.,  
444 glottography: Postgate, Wang, and Wilkinson 1995; Boltz 1993). Overall, the archaeological  
445 record is consistent with a gradualist account of the appearance of long, self-contained texts.

446

447 *Storing and retrieving writing*

448

449 The second ingredient of asynchronous communication is that documents should be easily  
450 consulted outside of their context of production, which requires durability and retrievability.  
451 When assessing the durability of early written documents, we are faced with one obvious  
452 problem: the archaeological record filters out durable material (Perreault 2019), erasing  
453 evidence of less durable texts. Two points can nonetheless be made with relative confidence.

454

455 First, the amount of perishable documents produced by the four areas that invented writing  
456 was probably massive compared to durable texts (preserved or lost) (Cooper 2004; Postgate,  
457 Wang, and Wilkinson 1995; Wang 2014). Haicheng Wang devotes large sections of his  
458 (2014) book to making this case. His main argument consists in showing that, in all four  
459 areas, permanent inscriptions frequently alluded to records that are entirely lost but must have  
460 been abundant and consistently maintained (see also Baines 2007: 115). Another important  
461 argument is direct written, pictorial, or fossil evidence for perishable notation systems, such  
462 as Egyptian wooden boards or Chinese bamboo strips. A third argument is the claim,  
463 presented by Steinkeller (2003; 2004), that Mesopotamian accounting tablets were inscribed  
464 after the transactions that they describe took place, drawing on information that was either  
465 held in memory or inscribed on memory props such as accounting sticks or calculi.

466 (Steinkeller sketches a similar argument for ancient Egyptian wooden boards: 2004, fn. 16.)

467 Some of this material was durable on the scale of a human lifetime, although it was perishable  
468 on an archaeological scale; but not all of it was. Wax or clay tablets are easily erased, for  
469 instance. The amount of written information that got jettisoned in this way (think of  
470 schoolchildren wiping a slate) is impossible to assess. Still, the arguments just summarised  
471 invite us to think of durable records as the exception rather than the norm. Even durable,  
472 monumental inscriptions were not necessarily fit for asynchronous communication, since  
473 many were invisible (because they were placed too high to be read, or walled inside a tomb,  
474 or enclosed in a talisman, etc., Egyptian funerary inscriptions being a case in point—Baines  
475 2007).

476

477 Perishable messages could have supported some amount of asynchronous communication, but  
478 not large amounts of it, unless they were produced in great quantity, which was extremely  
479 difficult and expensive until texts were produced in industrial or proto-industrial conditions.  
480 Adding to the difficulty, a text can only support asynchronous communication if its  
481 addressees come across it, which they can only do when texts are stored and ordered in the  
482 right ways—the problem of retrievability.

483

484 A set of written documents ordered and stored for future consultation is what is commonly  
485 known as an archive; but whether or not what archaeologists call archives really had all these  
486 properties is by no means uncontroversial. The term as commonly used (e.g. by the  
487 contributors of Brosius et al. 2003) seems to have a weaker meaning: the label seems  
488 applicable to any repository of documents (be they written text or mere accounting  
489 documents) in a palace or temple setting. Which of these repositories actually served as  
490 archives in the full sense of the word, and to what extent they did, remains a puzzle. Two

491 diametrically opposed takes on this matter are provided by Christopher Eyre's *The Use of*  
492 *Documents in Pharaonic Egypt* (2013) and Haicheng Wang's *Writing and the Ancient State*  
493 (2014). The two authors came to divergent conclusions while surveying overlapping material  
494 (Eyre's work being focused on Egypt but making frequent reference to Mesopotamia, while  
495 Wang's is a comparative study encompassing all four pristine inventions of writing, including  
496 Egypt).

497  
498 The case for ancient archives functioning as efficient tools for storing and consulting written  
499 information has important pieces of evidence in its favour. First of all, the repositories  
500 themselves: important stores of documents found in places where they would have been of  
501 obvious relevance to palace or temple officials. Even if the archives found in public places  
502 often were a mix of private and public documents (Eyre 2013; Fales 2003), at least a good  
503 fraction of them would have been useful to the administration's operations. There is also the  
504 occasional evidence (whose quality varies from one site to the next) of indexing techniques  
505 like the clay tags affixed to the cuneiform clay tablets preserved at Ebla (Wang 2014: 245–7),  
506 the hieratic inscriptions on the side of the tablets found at El Amarna (Parkinson and Quirke  
507 1995: 60), or the titles inscribed on the outside of papyrus rolls (ibid.: 60). The quality of the  
508 archiving techniques tends to increase with time, document collections becoming larger and  
509 more systematic until the age of classical libraries. Internally, documents become easier to  
510 consult with practices like indexing and tables of contents slowly emerging (they were still  
511 rudimentary and rare in classical Rome—Riggsby 2019). Early on, we find some occasional  
512 evidence of archived documents being consulted long after they were first assembled  
513 (Charpin 2019: 120–121; Eyre 2013: 94), supporting the basic idea that some very ancient  
514 archives at least were deliberately assembled for later consultation, and served this purpose, at  
515 least on occasion.

516  
517 On the other hand, a case can be made against seeing ancient archives as efficient tools for the  
518 frequent consultation of well-kept records, even for relatively late historical periods like  
519 Hellenistic Egypt, Classical Egypt, or even late medieval England (Eyre 2013; Thomas 1992;  
520 Clanchy 1993). The same arguments recur in all three books. First, the scarcity of evidence  
521 for systematic and continuous storage and preservation of documents (as would be evidenced  
522 by the existence of accurate annals or chronicles recorded systematically over long stretches  
523 of time), as distinct from the accumulation of documents on an *ad hoc* basis. This is an  
524 important theme in Eyre's book, which offers radical reinterpretations of documents usually  
525 thought to be records, which in his opinion are better seen as working documents not intended  
526 for future reference for anyone beside a handful of scribes (see Fales 2003 for a similar point  
527 of view on Neo-Assyrian archives). In the same light, he stresses (even late into the  
528 Hellenistic period) the poor organisation of documents, both in the content of the texts  
529 (consistency of subject matter, elementary division of parts, etc., being often absent), and in  
530 the way they were stored. Thomas on classical Greece and Clanchy on late medieval England  
531 paint similar pictures. One last reason to doubt that archives were routinely and efficiently  
532 consulted by bureaucracies is their relative lack of legal standing: in the periods and areas  
533 covered by Eyre, Thomas, and Clanchy, greater weight of evidence was given to oral sources  
534 compared to written ones. A testimony borne by a witness to a transaction often carried at

535 least as much weight as a written record, suggesting that written documentation was not  
536 emancipated from oral and mnemonic supports. The mixing of private and personal  
537 documents in the archives found in palatial settings (Eyre 2013; Fales 2003), along with the  
538 use of privately held documents with no publicly available copies, also suggests a paucity of  
539 abundant, well organised public archives.

540  
541 To summarise, there is evidence that writing enabled small amounts of asynchronous  
542 communication as soon as it was invented; but this needs to be balanced with equally strong  
543 evidence for two limitations that held asynchronous uses back. First, the amount of  
544 information contained in a single piece of text was often insufficient to make it suitable for  
545 decontextualized interpretation; second, documents were often lacking in durability or  
546 retrievability, meaning that they could only support a few instances of asynchronous  
547 communication. These two roadblocks were lifted quite gradually, and then only for some  
548 uses of writing. Today, many forms of literacy are almost exclusively synchronous, coexisting  
549 with asynchronous uses of writing, often within the same culture. For instance, the knowledge  
550 of Biblical Hebrew that a practising Jew needs to recite the Torah at a Bar Mitzvah uses the  
551 written word as a memory prop; the same person uses their literacy in English asynchronously  
552 when writing emails, reading books, etc.

553

#### 554 **4. Conclusion**

555

556 The combination of feathers and flight is an obvious evolutionary success story; feathers  
557 allow birds to control their flight, and to improve their aerodynamic profile. Yet, feathers and  
558 flight evolved (in dinosaurs, then in birds' ancestors) at different times, pushed at first by  
559 entirely different functional pressures (Clarke 2013). Several species have (or had) one  
560 without having the other; several species had both, but used them for entirely different  
561 functions (flight for locomotion, feathers for thermal regulation or display). Only in the avian  
562 lineage was the potential of feathers as flight facilitator fully realised; elsewhere, feathers  
563 served other functions. The evolution of feathered flight was piecemeal. Realising this helped  
564 zoologists studying feather evolution avoid a number of pitfalls. In particular, they realised  
565 that the reasons why flying with feathers is adaptive today may not have been the reasons why  
566 flying with feathers evolved. Niko Tinbergen would have said that questions concerning a  
567 trait's evolutionary history should be strictly dissociated from questions concerning its  
568 adaptive function (Tinbergen 1963).

569

570 Just like feather-powered flight, the evolution of writing was piecemeal. Literacy as you and I  
571 know and practice it is made up of at least three distinct features: glottography (the notation of  
572 language), the availability of a generalist code that can note down anything we can say, and  
573 asynchronous communication—the ability to get a message to other people across space and  
574 across time. The connection between these three features is not, in my view, accidental. I have  
575 argued elsewhere that glottography was the only way (at least until recently) to arrive at a  
576 generalist graphic code (Morin, 2022); that writing was uniquely suited for asynchronous  
577 communication (Morin, Kelly, and Winters 2020). But this does not mean the three features

578 evolved together, or for the same reason. This paper argued that glottography, generality, and  
579 asynchronous use evolved out of synch with one another. Two huge lags separate, first, the  
580 invention of glottography from its generalisation beyond proper names, second, the existence  
581 of writing as a generalist tool from the routinisation of its asynchronous use. At each step, the  
582 inventors of writing responded to distinct and specific pressures. The inventors of  
583 glottography were not necessarily aware of their invention's potential beyond the notation of  
584 proper names. Those who developed writing into a generalist tool, capable of encoding  
585 anything that can be said, were just as unaware of the future of writing. They were unlikely to  
586 anticipate that the code they were using as an accompaniment to oral recitations, or as a  
587 reminder of transactions they took part in, would come to be used for the most part in a quite  
588 different way: to store information for the benefit of distant recipients to whom the  
589 information would be new, with no need for an oral gloss or an art of memory.

590  
591 Writing evolved, and its evolution may have been longer and more gradual than commonly  
592 thought. Evolutionary approaches of writing, today (see e.g. Lock and Gers 2012), do not owe  
593 anything to the outdated approaches that, for some, had made it synonymous with naïve  
594 teleology or with ethnocentrism. On the contrary, an evolutionary perspective can help us  
595 correct a number of functionalist biases that may orient our view of writing's history, and help  
596 us appreciate how unlikely and contingent this invention may have been.

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