From phonemic spelling to distinctive spelling

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1   A generalization about script histories

In any area of scientific study, people want to go beyond describing particular instances to discover general patterns that apply to all or most cases of the phenomenon studied.[1] Within linguistics, that is specially difficult to achieve in the case of writing systems, because there are so few independent examples. Someone who postulates a generalization or universal property applicable to spoken languages can test his hypothesis against thousands of different languages which fall into dozens of separate language-families that (so far as we can tell) emerged quite independently of one another. With writing systems the data are nowhere near that rich. Within living memory, there were scholars who thought it likely that all the world's scripts share a single origin. True, in the 21st century it is no longer seriously possible to believe that. Apart from any other considerations, the successful decipherment of the Maya script of Central America has shown us one clear case of a sophisticated writing system which could not have shared a common ancestry with the early Middle Eastern scripts from which many modern writing systems, including our own, ultimately descend. And if we know that writing has been invented at least twice in world history, it is easy to believe that it has probably been invented more than twice. The earliest examples we have of Chinese script look like a system invented independently of the ancestry of Sumerian Cuneiform, the earliest Middle Eastern script; there could have been historical links which have vanished from the record – people did come and go from one end of Asia to the other – but the probability is that there were no such links. Nevertheless, at most we have only a few independent cultural traditions of writing, nothing like the dozens of separate spoken-language families. If we think we have detected common patterns among various scripts which share a common origin, then it is hard to be sure that the common patterns are pointing to something essential about the human activities of writing and reading, rather than just to something which happened by chance to be true of the ancestral system and has been inherited by many or all of its descendants.

So it is not easy to establish "universals of written language". But we should like to do that, all the same. The difficulties perhaps just mean that we have to be specially alert to the clues which we do find in our limited data, and to make the most of what those

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clues offer us.

In this paper I want to argue for one tendency which I believe may be a general property of the world's writing systems. I call it a "tendency", because I certainly do not claim it as an absolute truth which would be refuted by a single counter-example. There undoubtedly are counter-examples, but in the human sciences we don't find many absolute rules. Probabilistic tendencies are often as much as one can hope to find. But a probabilistic tendency can be enlightening, and I hope this one is.

The tendency I postulate is that orthographies evolve from being phonetically-based when they are young, towards being lexically-distinctive as they mature. I shall enlarge on what I mean by "phonetically-based" shortly, but for the time being the simple gloss "one sound one symbol" will do. What I mean by "lexically-distinctive" is much less obvious. I am using this phrase to stand for two separate properties. In the first place, I suggest that more mature scripts tend to assign a constant written shape to each lexical element – each morpheme, or at least each root (as opposed to grammatical affix morphemes) – even if that element varies its phonetic shape in different environments, as in cases like English *divine ~ divinity*, where adding the suffix causes the stressed vowel of the root to change from /aɪ/ to /ɪ/. But also, and perhaps more controversially, I am suggesting that the letter-sequences which maturer scripts assign to various lexical elements tend to be more distinctive in the sense of having few near neighbours. There will be relatively fewer cases where substituting just one letter for another gives you the spelling of a different lexical item.

In a lexically-distinctive orthography, meaningful units tend each to have one constant written form, and that form tends to be as different as possible from the spellings of other meaningful units. These two properties are logically independent of one another. An orthography could ignore morphophonemic variation, while the spellings of its vocabulary were so densely crowded together that almost any substitution of one letter for another in a word gave another word. And conversely a language might reflect every case of morphophonemic alternation by a spelling difference, yet still have its set of spellings sparsely scattered so that very few pairs of words differed by just one letter. But although the two properties are logically independent, I suggest that in practice they go together: maturer scripts tend both to ignore morphophonemic variation and also to have sparsely-scattered spellings.

What is more, I am going to suggest that not only does this tendency exist, but it is good that it exists. By evolving so as to possess a greater degree of the properties I associate with maturer scripts, a writing system is adapting to the changing needs of its user community.

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2   Phonemic spelling as fact and as ideal

In the early decades of synchronic linguistics, I think it was widely taken for granted both that (i) at early stages in the history of a script, provided the script was phonographic at all, there would normally be something close to a one-to-one relationship between letters and phonemes, and that (ii) an ideal orthography *should* be like that: the "phoneme" could almost be defined as the unit of a language which would be assigned a distinct symbol in an ideal orthography for that language. So for instance Daniel Jones wrote in connexion with (i) that "it is natural that in their early attempts at representing their languages by means of an alphabet men should write them phonemically" (Jones 1967: 253);[2] and in connexion with (ii), "It is clear that the best type of spelling is a system based on the principle of one letter for each essential sound" (Jones 1944); "*orthography*, [i.e.] what is needed for ordinary current intercourse in writing ... should have the principle 'one letter per phoneme' as its basis" (Jones 1967: 226). Donald Frantz wrote (1978: 308) that "most people engaged in orthography design have accepted the principle of 'one symbol for one phoneme' as an ideal", and he pointed out that the subtitle of Kenneth Pike's standard 1947 textbook on phoneme theory was *A technique for reducing languages to writing* (Pike 1947).

The great flourishing of phonetic science which occurred in Britain in the late nineteenth and early twentieth centuries was partly motivated by the belief that English needed to be given a reformed, phonetically-rational orthography. Daniel Jones was both the man who developed and publicized the (originally Polish/Russian) concept of the phoneme as a theoretical entity, and also an active member of the Simplified Spelling Society (Ripman and Archer 1948: 4).

So far as the factual issue, point (i), is concerned, it seems to me that Jones was essentially correct: early orthographies do tend to hug the phonetic ground quite closely. The example I use in my *Writing Systems* book (Sampson 2015: 114) is Ancient Greek, which had the world's earliest fully alphabetic script. Ancient Greek had quite a lot of predictable morphophonemic variation, so that for instance the last consonant of the root /prāg-/ 'do' assimilated to suffixes, yielding forms like the following cases of the perfect passive paradigm:

1st sing.	pɛ-prāŋ-mai
2nd sing.	pɛ-prāk-sai
3rd sing.	pɛ-prāk-tai
2nd pl.	pɛ-prākʰ-tʰɛ

Although this variation was automatic and lacked semantic significance, it was nevertheless reflected in Greek spelling:

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2   The Appendix from which this quotation is taken, "The history and meaning of the term 'phoneme' ", was first published in 1957.

πε<u>πρα</u>γμαι
πε<u>πρα</u>ξαι
πε<u>πρα</u>κται
πε<u>πρα</u>χθε

As I say in *Writing Systems*, this is as if the English words *optic*, *optics*, *optician*, *opticist* were to be spelled < optik, optix, optishan, optisist >.[3]

3   Alternative phonological principles

Greek seems to me to have been rather typical of early phonographic scripts in conforming to the factual point (i). But my main concern in this paper is with the evaluative issue, point (ii), and there I shall be arguing that Daniel Jones was mistaken.

Linguists have often understood that other considerations come into play which mean that a perfect one-phoneme-one-symbol correspondence is not always the ideal for a practical orthography. But the considerations that people have mainly brought forward are ones of a political or social kind, unrelated to language structure: see e.g. Cahill (2014). For instance, a Third World society whose language is being reduced to writing for the first time might not be happy with an orthography which deviates too much from the norms of whichever First World language is dominant in its region. If the language has a voiceless velar stop phoneme, any linguist would be inclined to write it as < k >. But if the language is spoken in South America, by people in contact with Spanish speakers (who hardly use the letter < k >), then it might be advisable to spell the phoneme as < c > in most circumstances and as < qu > before front vowels, even though this use of different symbols for the same phoneme is in linguistic terms irrational.

It is also true that from the 1960s onwards, many linguists ceased to believe that the phonological units represented in a linguistically-ideal orthography should be *phonemes* in particular – because generative linguists (notably Morris Halle 1959) argued that, as a theoretical entity, the "phoneme" does not make sense. But that merely led them to propose that ideal orthographies would represent phonological units of a different kind, comparable to what earlier linguists had called "morphophonemes". Chomsky and Halle's influential *Sound Pattern of English* (1968) argued that, even in a language whose lexical roots are phonetically realized in a variety of ways in different linguistic contexts (e.g. English *metre ~ metric ~ telemetry*,

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3   Greek orthography did not reflect the phonetic difference between [ŋ] in the 1st singular form of the example verb and [g] in the unmodified root (e.g. πραγος /prag-os/ 'a deed'), but that was because the alphabet inherited from Semitic speakers offered no letter for [ŋ]. Since that sound never occurred in Greek other than through assimilation to a following consonant, no Greek letter was created for it.

with /i/ ~ /e/ ~ /ə/ respectively), native speakers store the roots in their minds in single "underlying" phonological forms and apply rules to derive the appropriate surface forms when the roots are uttered. An ideal orthography would spell out underlying forms, which in some cases would be very different indeed from any of the surface forms which realize them. Famously, Chomsky and Halle argued that the English word *righteous* contains an underlying velar fricative | x |, corresponding to the *gh* of the spelling, even though no English word contains an /x/ sound at the surface.

Keith Snider (2014: 27) notes that this implausible-sounding theory from almost fifty years ago continues to exert a remarkable hold over current thinking. But it is not easy to accept the psychological reality of Chomsky–Hallean "underlying forms", for one thing because they assume an awareness of etymological relationships among derived words which the average native speaker seems unlikely to possess. The classic demonstration of that flimsy assumption, to my mind, came in an article by Noam Chomsky's wife Carol (C. Chomsky 1970), where she described suggesting to a schoolchild of about 12 that she should consider the word *signature* when deciding how to spell *sign*, only to receive the response "so what's one got to do with the other?" – and then revealed in the same article that she herself, Carol Chomsky, believed the words *prodigious* and *prodigal* to share a common Latin root. (They don't.) If an English-speaker appreciates that the noun *signature* derives from the verb *sign*, it seems more likely that this is because learning the spelling of *sign* showed him the relationship, than because the spoken form *sign* is stored in his mind with an underlying | g | and that is how he knows how to spell the word.

Snider (2014: 43–4) does not advocate reverting to the pre-Chomsky–Halle idea that the linguistically ideal orthography represents phonemes. Instead, he suggests that it should represent a level intermediate between Chomsky–Hallean underlying phonology and the phonemic level, defined in terms of a modern phonological theory called Stratal Optimality Theory which I must confess I do not understand. What is common to all these different points of view, it seems to me – the early idea that an orthography should ideally be phonemic, the Chomsky–Halle idea that it should represent "underlying phonology", and Keith Snider's compromise position – is that they all assume that (apart from political or social considerations having nothing to do with the structure of a language) the only considerations determining what makes for a good orthography are purely phonological considerations. I want to say that, on the contrary, lexical distinctiveness is also a highly relevant structural issue.

4   Constant lexical shapes

The first of the two tendencies I identified above as jointly contributing to "lexical distinctiveness" was constancy of shape for lexical elements, even when they have varying phonetic realizations. We have plenty of cases in English: but in English it is usually impossible to tell whether the orthographic constancy results from an

abstract desire to have fixed spellings for individual morphemes, or simply from conservatism. The obvious examples are the many vowel alternations produced historically by the Great Vowel Shift, such as the *divine ~ divinity*, *metre ~ metric* examples already quoted, where the vowels are spelled alike despite being pronounced quite differently in modern English. English orthography developed long before the Great Vowel Shift occurred, so the pairs of forms were naturally spelled alike originally, and the usual explanation for why the spelling has remained the same since the Shift is that English spelling habits were too conservative to adapt to the change in pronunciation. Very likely, for English, that explanation may be correct.

But there are other languages and orthographies for which a similar explanation will not work. The example I give in *Writing Systems* is Korean. This is a language with many morphophonemic alternation rules, which have the effect of creating differences among contextual forms of the same lexical root that seem large, relative to what we find in English or other European languages. A good example is the name of the Yalu River which separates Korea from China: it derives historically from *ab-log-gaŋ ('duck-green-river') but is actually pronounced /amnoKaŋ/ (/K/ represents a tense unaspirated stop) – every consonant but the last is different; and in other contexts the original consonants show up in the respective morphemes in their original form, for instance the /l/ of *log 'green' remains an /l/ when it follows a vowel.[4]

The phonographic script used for Korean was invented as recently as the fifteenth century, by which time most or all of the relevant sound-laws had already applied to the language. When the script was new, it was used in ways that faithfully reflected the surface phonetics. I have not seen a fifteenth-century inscription of the name Yalu River, and fifteenth-century Korean orthography was less standardized than it later became, but from what I know about it it seems pretty clear that a likely spelling would have been something like < ʔam no Kaŋ >, and the spelling of the 'green' morpheme would have varied depending on whether or not it followed a vowel. But the conventions changed, so that modern Korean spelling unpicks the consequences of sound-laws which produce alternative forms for individual morphemes, and consistently spells them as if those laws had not applied. 'Yalu River' is now spelled < ʔab-log-gaʔ >, so that for instance the initial consonant of 'green' is written as < l > even though probably a majority of occurrences of that morpheme, including this one, have /n/ as the actually pronounced initial consonant.[5]

This certainly cannot be seen as orthographic conservatism. It is the opposite of conservatism: it was a large change in Korean spelling habits, and its only virtue was

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4   The English name Yalu transliterates the modern Mandarin Chinese pronunciation of the first two morphemes, which have undergone many sound-changes within Mandarin since they were borrowed from Chinese into Korean.

5   In modern Korean script, the originally-distinct letters < ʔ > and < ŋ > have come to be written alike (and are both transliterated as < ʔ > here); this creates no ambiguity, because the two sounds are in complementary distribution.

to give lexical items constant orthographic shapes despite their varying spoken forms.

To me it makes good sense that when a society first embarks on the enterprise of recording speech in a phonographic script, and the whole activity is novel and therefore difficult, the instinct would be to hug the phonetic ground closely. "Writing" would seem to *mean* making marks which give as precise as possible a record of the sounds coming out of speakers' mouths. But when reading and writing came to be a familiar, routine component of social life, skilled readers would "read for meaning", and the most efficient way for them to extract an author's meaning from a text would be for the meaningful units of the language to have a constant orthographic form, whether or not their pronunciation was subject to contextual variation. People commonly seem to imagine that if spellings are not *phonetically* rational, the only possible explanation is mindless conservatism (the quotations from Daniel Jones, earlier, suggested that he may have held this point of view). But that is not so. The desire to have constant forms for meaningful units is another kind of rationality, which may sometimes pull in the same direction as simple conservatism, but sometimes pulls in other directions.

5 Density of orthographic neighbourhoods

The other property contributing to what I call lexical distinctiveness is whether or not words (or other meaningful units of a language) have many close orthographic neighbours – other words which differ by only one letter, or by few letters in a long sequence.

Commonly, linguists who think about distinctive spellings are concerned with perfect homophones. Linguists frequently suggest that even though it is phonetically irrational that the English /i/ vowel is spelled < ee > in some words and < ea > in others, this does have the advantage of providing distinct written forms such as *meet* and *meat*, or *seem* and *seam*. But the spelling of a word can be distinctive or non-distinctive even if the word has no homophones. Thus, the English syllables /ʃɑk/ and /wɔf/ are alike in representing only one morpheme each, *shark* and *wharf* – there are no homophones of either word. But the spelling *shark* is only one letter away from a number of other English words: *stark*, *spark*, *shirk*, *shank*, *share*, *sharp*, perhaps more; but so far as I can think, it is not possible to turn *wharf* into any other word by changing just one letter. The spelling *wharf* is very distinctive, the spelling *shark* is not very distinctive.

Common sense would suggest that a skilled reader's task of extracting meaning efficiently and rapidly from a written text will be easier, if meaningful elements tend to be written distinctively. And there has been quite a lot of psycholinguistic research showing that that is so. It is harder to read words if they have more orthographic neighbours, particularly when the neighbours are common words. As Manuel Perea

and Eva Rosa (2000: 331) put it, "the number of higher frequency neighbors inhibit[s] lexical access in normal reading ... this inhibition ... could be conceptualized as a competition process among lexical entries".

Note that this effect applies to *normal reading.* In the artificial experimental task of lexical decision, where the subject is presented with a letter-string and has to decide whether or not it is a word of his language – and particularly when the subject is a child – distinctiveness of spelling has the opposite effect: decisions are made more efficiently when words have many orthographic neighbours (e.g. Andoni and Vidal-Abarca 2008). The psycholinguists' findings are complicated, but one plausible way of making sense of them would be to say that, for less-skilled readers, being able to make analogies with the spellings of other words helps them to work out what word a given letter-string might represent, whereas skilled readers well know which words correspond to what letter-strings, and merely need to avoid momentary confusion with similar-looking strings.

Even linguists who concede that unphonemic spellings could be advantageous if they allow diversely-pronounced allomorphs to appear in a constant visual shape normally see no virtue in a spelling like *foreign.* This English lexical item has no allomorphs, it is always pronounced /fɒrən/ both as an independent word and in derived forms (*foreigner, foreignness*), and the < -eign > spelling obviously makes no phonological sense at all. The consensus view is that the spelling was originally just a mistake, which has been preserved because of the dogged reluctance of English-speaking society to rationalize its orthography.[6] But in terms of lexical distinctiveness, *foreign* is a good spelling. It certainly looks very different from any other English word – more distinctive than it would look if it were spelled *foran* or *forain,* in line with its true etymology. The spelling may have originated through a mistaken etymology, but the fact that it has been retained is not necessarily irrational.

6 Lexical distinctiveness versus conservatism

I am arguing that orthographies tend to begin phonetically-based and move towards lexical distinctiveness. It is easy to find further examples of "beginning phonetically-based". Just to quote one example from my recent reading, Joachim Yeshaya (2014: 530) mentions changing spelling conventions in the tradition among Arabic-speaking Jews of writing their native Arabic language in Hebrew letters. Initially, "words were transcribed on the basis of phonetic principles, free from the influence of Classical Arabic orthography", though in the course of the tenth century of our era this developed into a system which reflected Classical Arabic spelling conventions.

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6   The history in brief is that *foreign* was so spelled because someone erroneously took it to be related to the word *reign,* which has a < g > because it derives from Latin *rēgnum* (in Latin of course the < g > was pronounced). *Foreign* actually derives via Norman French from Latin *forāneus,* which never had a /g/.

Unfortunately Yeshaya gives no examples of these conventions, and I do not know enough about Arabic to guess whether the changes he refers to led to greater lexical distinctiveness. As an example of "moving towards lexical distinctiveness" I tentatively offer the changing English spelling of the spoken abbreviation /maɪk/ for *microphone*. For most of the twentieth century this had a well-established spelling *mike*, predictable from the spoken form. But recently I have often encountered the phrase *open mic*, which puzzled me when I first saw it because one would expect < mic > to represent spoken /mɪk/. However, the < mic > spelling improves lexical distinctiveness: it resembles the full form of the word, and it has far fewer orthographic neighbours than < mike > (the only two which occur to me are *mac* and *tic*).

I admit to being hesitant about this example, because I am not sure I am aware of all the facts. (Is there some special reason why *mic* seems to occur only in a phrase following *open*?)[7] And in general it is harder to produce indisputable examples of "moving towards lexical distinctiveness" than of "beginning phonetically-based", because it is so often difficult to distinguish distinctiveness-increasing developments from simple conservatism. (Conservatism does not always mean leaving spellings unchanged; sometimes it involves deliberately changing spellings in order to reflect Classical etymologies, as when the French took to writing *temps* instead of *tems* and *vingt* instead of *vint* in order to make visible links with Latin *tempus*, *viginti*.) Korean is quite unusual in having a phonographic script that was created from scratch in rather recent times, so when spellings were changed to "undo" the effects of morphophonemic variation we can be sure that the motive was not conservatism in any sense. Nevertheless, while many cases are open to alternative interpretations, I believe linguists are often too quick to assume that conservatism is the best interpretation.

Nobody suggests – certainly I do not suggest – that a drive towards greater lexical distinctiveness is the *only* factor moulding the evolution of scripts. They are influenced by a mass of factors, many of which are pure historical accidents having no structural rationale of any kind. (Consider for instance the point mentioned in note 3, that early Greek spelling had no special letter for the [ŋ] sound which existed in the language, because the Semitic languages from which the Greeks borrowed the alphabet happened to lack that sound.) But a trend towards greater lexical distinctiveness is one significant factor, I believe, which linguists have often overlooked.
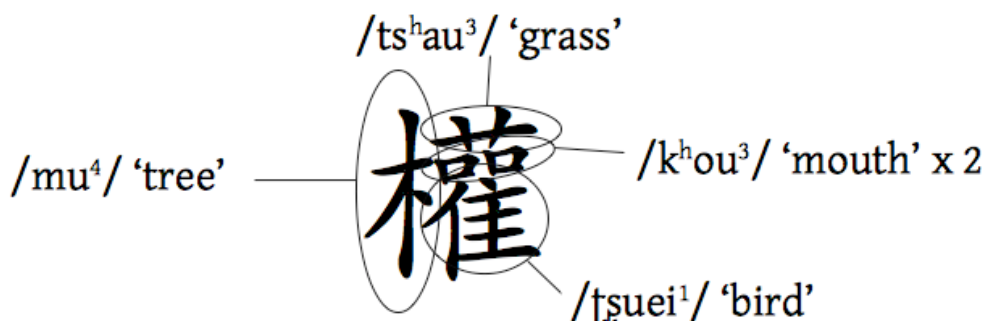
7   A *reductio ad absurdum*?

At this point, sceptical readers may suspect that I am verging on a *reductio ad*

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7   Since drafting the above, I have encountered one instance of *mic* used other than following *open*.

absurdum. If the best orthography is one with high lexical distinctiveness, then presumably one could produce a great improvement on traditional English spelling by assigning completely random letter-strings to our vocabulary items. We might spell *cat* as < pfg > and *dog* as < wxxq >. We could certainly reduce the number of near orthographic neighbours for an average word quite substantially that way. And of course we could still ensure that a root like *divin-* was always spelled the same way, whether in context it was pronounced /dɪvaɪn/ as an isolated word or /dɪvɪn/ before *-ity*: we might spell both forms alike as < hpzu >, say. If that would be such a wonderful orthography, how come we never find orthographies like that in real life?

Well, in a way we do. The logographic Chinese script can be seen as approximating a system which assigns to each element of the vocabulary a random distinctive visual form; and it works very well. Chinese graphs, other than the simplest, are not unanalysable Gestalts, of course: most of them are assemblages of simpler components each of which occurs as part of many other graphs. But that is like the fact that my suggested spelling < pfg > for *cat* is an assemblage of letters drawn from a limited alphabet. The point relevant here is that one cannot normally *predict*, from a knowledge of the sound and meaning of a Chinese word, what its written form will be – just as, in my hypothetical new English orthography, one could not predict that *cat* would be spelled < pfg >.

Consider, for instance, the word /tʃʰyan²/ 'authority', which is written as follows:

/tsʰau³/ 'grass'

/mu⁴/ 'tree'　權　/kʰou³/ 'mouth' x 2

/tʂuei¹/ 'bird'

Each of the five graphic components is very familiar to literate Chinese, since each occurs in many other graphs. But why the word 'authority' should involve that particular array of components is entirely opaque.

It is true that there was a clear logic in the way that Chinese writing was originally developed, and as a result most present-day Chinese graphs can be divided into two parts, one of which was originally chosen as an approximation to the pronunciation of the target word while the other part was chosen to reflect the general semantic field within which the meaning of that word was located. Some linguists who want to believe that no respectable writing system can fundamentally be too different from

alphabetic European writing, notably John DeFrancis (1984, 1989), have suggested that this structure makes it unreasonable to think of the Chinese script as assigning arbitrary written forms to words. But the script was developed more than three thousand years ago, and Chinese words have changed both their pronunciations and, in many cases, their meanings a great deal since then, while the script has remained largely stable. Consequently graphs whose structure was logical when they were invented have often lost that logic long ago. The 'authority' graph is a good example. The sense 'authority' began as a figurative extension of a (now long-obsolete) concrete sense referring to the weight on a steelyard; the weight was made of wood, hence the 'tree' component was appropriate. The remainder of the graph without that component (all the right-hand side) stood for a word /kuan^4/ 'heron' and was originally a picture of a heron, though as the script lost its pictorial character this single graphic unit was resolved into four simpler shapes. When the script was developed, the 'heron' graph was phonetically appropriate to write 'weight on steelyard', because the pronunciations of the respective words were closer than the present-day pronunciations /kuan^4/, /tʃʰyan^2/ – but for a 21st-century Chinese that issue is irrelevant, since the 'heron' word is now obsolete (the modern name for the heron is an unrelated word).

This loss of transparency tends to be particularly applicable to higher-frequency words. According to Shu and Wu (2006: 113), of the graphs occurring in school textbooks which began as phonetic/semantic compound graphs, only about seventeen per cent now have a pronunciation matching their "phonetic" element.[8] (I know of no comparable figure for the extent to which semantic elements of compound graphs remain appropriate – the percentage is probably higher, but it is certainly easy to think of graphs whose "semantic" element is wildly at odds with current word-sense.[9]) An additional loss of logical transparency has occurred since the 1950s within the People's Republic of China, as a result of the replacement of many visually-complex graphs by simpler alternatives, e.g. /tʃʰyan^2/ 'authority' is now written 权. The right-hand side of the simplified graph is a word pronounced /jou^4/ and meaning 'also' – even historically it never had any phonetic or semantic connexion with /tʃʰyan^2/ 'authority', it is merely a simple shape arbitrarily used as a substitute for various complex graph-components.

As in the case of alphabetic writing, it seems that with Chinese writing transparent graph structure is something that matters to young children, but for skilled readers what matters is distinctiveness of overall graph shape. Zhao et al. (2012) experimented with schoolchildren of different ages identifying graphs having many

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8 I surmise that this figure refers to graph-tokens rather than types, though Shu and Wu are not explicit about that.

9 Peng and Jiang (2006: 346) quote research which claimed that the figure for appropriate semantic elements is *lower* than for appropriate phonetic elements. But both the figures given by Peng and Jiang are so high that it seems the research must have used some specialized and very lax criterion of appropriateness. (I have not see the material cited by Peng and Jiang, which was published in China.)

or few orthographic neighbours, in the sense of shared graph-components, and they found that high neighbourhood density is a positive factor for young children but an inhibiting factor for older children, with the crossover coming about age 11–12 years.

So I do not believe that my hypothetical orthography which spells *cat* as < pfg >, *dog* as < wxxq >, and so forth is a *reductio ad absurdum*. For sure, no real-life language is ever going to adopt an orthography like that, but that is because complex cultural institutions are things that evolve gradually – we just don't throw central aspects of our culture overboard in favour of artificial replacements dreamed up by scientists who assure us that for abstract reasons, hard for most people to understand, they will be more efficient than what we have now. But if, *per impossibile*, the English-speaking world were to abandon our traditional orthography for a *pfg/wxxq*-type spelling system, with higher lexical distinctiveness than current spelling, then the evidence does suggest that for those who became skilled users of the new orthography, it might be more efficient than our familiar system. It just so happens that gradual cultural evolution in China has given them an orthography which is much closer to the *pfg/wxxq* type than any alphabetic script will ever be.

I have the impression that many Western linguists feel that it is irrelevant to introduce allusions to Chinese script into discussions of ideal alphabetic orthographies, because they imagine that the Chinese type of script is unreasonably cumbersome and is retained mainly for reasons unrelated to reading and writing efficiency, such as national pride, the need for a unified script in a country with mutually-unintelligible regional dialects, and so forth. As I see it, that is no more than an ignorant reaction to the unfamiliarity of the Chinese system. (As a European who has been studying the Chinese language for fifty-odd years, I don't myself see its script as cumbersome.) But until recently there was little hard evidence one could point to in this connexion. Nowadays there is the PISA programme under which the OECD periodically tests fifteen-year-olds in 65 developed countries to assess their core educational attainments. I do not want to downplay the difficulties of like-for-like comparisons across countries with different school systems, attitudes to learning, IQ distributions, and so forth – these difficulties are great; and furthermore the PISA scores for reading measure how skilled people become at reading their national language, which is not the same thing as how efficient the script is for those who do become skilled readers. Nevertheless, looking at the PISA results is surely more instructive than discussing script excellence in terms of mere impressionistic prejudices. The ten highest-scoring countries in the latest round of PISA tests for reading were as follows:[10]

   570   China–Shanghai[11]
   545   Hong Kong

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10 These data relate to tests taken in 2012. Another testing round was due in 2015, but at the time of writing results from this do not yet appear to have been published.
11 The PISA programme uses Shanghai as a proxy for Mainland China as a whole.

542   Singapore
538   Japan
536   Korea
524   Finland
523   Canada, Ireland, Taiwan
518   Poland

This list surely casts doubt on the suggestion that logographic Chinese script is a specially "cumbersome" type of writing.

Some scholars with a particularly low opinion of Chinese-style script suggest that speakers of languages using such script may succeed in learning to read and write well, but this task is so onerous that it is hard for them to learn anything else. According to William Hannas (1997: 125), "Instead of using language to learn, East Asians are wasting their youth and resources learning about language." In response to that, here are the highest PISA scores in science:

580   China–Shanghai
555   Hong Kong
551   Singapore
547   Japan
545   Finland
541   Estonia
538   Korea
528   Vietnam
526   Poland
525   Canada, Liechtenstein

8   Learners' interests versus skilled readers' interests

Uncontroversially, moving away from phonetically-transparent orthography does have disadvantages. Notably, it makes life harder for learners. There does not seem much doubt that if the script a child is faced with is alphabetic at all, then the learning task is easier if there is a regular, predictable relationship between pronunciations and spellings, with few or no irregularities, as we find with languages such as Spanish or Finnish.

But what is good for literacy-acquiring children is probably not what is good for mature, skilled readers. Discussions of ideal orthographies have given far too much weight to the interests of the child learner, as opposed to those of the skilled reader. That is understandable: we can see the visible struggles our children go through in the process of learning to read, so of course anything that promises to ease those struggles looks attractive. We are not in the same way directly aware of efficiency

differentials in the process of skilled reading of diverse orthographies. If such differentials do exist, they can only be inferred indirectly and abstractly, so we take little account of them.

Furthermore, both sets of interests are valid, so an "ideal orthography" ought to represent some kind of trade-off between them, and I cannot imagine any way of calculating what the optimal trade-off would be. Reverting for a moment to my hypothetical *pfg/wxxq* orthography for English: if it were possible to bring about a situation in which this was the standard English orthography, then its additional lexical distinctiveness might make word-recognition and hence the activity of reading a bit more efficient – but surely the gain could only be marginal. On the other hand, it is easy to believe that the additional challenge for young children in learning an entirely arbitrary mapping from vocabulary into letter-strings would be much more than marginal. Learning to read might take significantly longer, consume more teaching resources, and many more children might fall by the wayside than is the case today. If so, on balance society would have lost rather than gained.

But although it seems impossible to know precisely where the ideal balance would fall, what we can say is which direction it has been moving in. When a society is newly literate, almost everyone is a learner, and written documents play only a limited role in the life of the society: making the learner's task easy is worthwhile, while the precise degree of efficiency of the activity of fluent reading is a minor consideration. In advanced modern societies, on the other hand, almost everyone learns to read in early childhood, so that most individuals spend the bulk of their lives as relatively skilled readers, and the role of written material in such societies is much greater than before – so the overall balance of advantage must have shifted towards somewhat greater weight for the skilled reader's interests. Furthermore life expectancy has shot up, so that although it may take as long as it ever did to learn to read, the time spent acquiring literacy has become much shorter as a fraction of the average individual's lifetime. Again this suggests that the skilled reader's interests are now more significant, and the child learner's less so, than in earlier states of society. Lexical distinctiveness matters more than it did; phonetic transparency less.

So we might expect that in an ideal world, orthographies which historically began as perfectly phonemic or nearly so, might have gradually evolved to increase lexical distinctiveness, by spelling roots in constant forms despite sound-laws which create contextual variation in their pronunciations, and by adopting idiosyncratic spellings which might be phonetically illogical, but which have the effect of making words less visually similar than they would be in a perfectly phonemic spelling.

In other words, we might expect the history of an ideal orthography to look rather like the history of English spelling. The many oddities of modern English spelling may well have come about because of factors such as conservative reluctance to adapt to changing pronunciation, or the economics of early-modern printing which paid

compositors by the line (and hence gave them an incentive to spell words with extra letters), or various other "irrational" considerations. But those who over the centuries shaped the English spelling system were working better than they could have known. The fact that we have retained this odd system, despite advocacy by such as Bernard Shaw and the Simplified Spelling Society for a more regular orthography, may be a very wise response (though certainly not a consciously planned response) to modern social conditions.

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