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SEÇÃO: ARTIGOS

Literacy in Contact and in Context: Multilingual Reading and Writing along the Silk Routes

Literacia em Contato e em Contexto: Leitura e Escrita Multilíngue nas Rotas da Seda

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Abstract: According to UNESCO, at least 2500 languages are vulnerable. Chinese, English, Spanish, Arabic, Hindi, Portuguese, Bengali, Russian, Japanese, French are "hegemons" - each having at least 100 million native speakers and accounting for over 51 percent of the global population. Half of the hegemons are written with an alphabet. For the non-alphabetic group, native speakers may read and write in logographic (e.g. Chinese) or syllabic writing systems (e.g. Devanagari) or both (e.g. Japanese). In languages that are spoken by less than one million people, Latin, Arabic and Chinese writing systems dominate but they do not always map to local dialects transparently. Multi-literacy is a growing global phenomenon particularly in Asia. In the 21st century, access to electronic literacy will include multi-literate speakers. However, multi-literacy brings questions. Multi-literacy is as old as civilization due to spoken language contact in commerce, ideology and religion. Literacy adapts to new technology via codification of symbols allowing multi-literacy to grow. Documentation of writing has a history but it is not prominent in global policy making. Programmes to develop literacy are reserved for monolingual 'hegascripts' (dominant languages) e.g. English. However, neglecting diversity in writing systems in developing countries risks more inequalities if indigenous language speakers are taught literacy in their non-native language only.

Keywords: Literacy. Multilingualism. Reading and writing.

Resumo: De acordo com a UNESCO, pelo menos 2.500 línguas faladas estão vulneráveis. Chinês, inglês, espanhol, árabe, hindu, português, bengali, russo, japonês e francês são "hegemonias" – cada uma tendo pelo menos 100 milhões de falantes nativos e representando mais de 51 porcento da população global. Metade das hegemônicas são escritas com um alfabeto. Para o grupo não-alfabético, os falantes nativos podem ler e escrever em sistemas de escrita logográficos (por exemplo, o chinês) ou silábicos (por exemplo, o devanágari) ou ambos (por exemplo, o japonês). Em línguas faladas por menos de um milhão de pessoas, os sistemas de escrita latino, arábico e chinês dominam, mas eles nem sempre se assentam de forma transparente com dialetos ou línguas locais. Multiletramento é um fenômeno global crescente, particularmente na Ásia. No século 21, o acesso à mídia eletrônica incluirá falantes multiliterados. Isto provavelmente também é um fenômeno global devido à ampliação do acesso a tecnologias tais como smartfones, mídia social e redes rápidas. No entanto, a multiliteracia traz perguntas. A multiliteracia é tão antiga quanto a civilização devido ao seu contato entre línguas usadas no comércio, ideologias e religião. A literacia se adapta às novas tecnologias por meio de codificação de símbolos que permitem o crescimento da multiliteracia. A documentação da escrita tem uma história, porém não é proeminente na política global. Os programas para desenvolver a literacia são reservados para as "hegascripts" (línguas dominantes) monolíngues, por exemplo o inglês. No entanto, negligenciar a diversidade dos sistemas de escrita em países em desenvolvimento traz o risco de desigualdades se os falantes de uma língua indígena forem letrados apenas na sua língua não nativa.

Palavras-chave: Literacia. Multilinguismo. Leitura e escrita.

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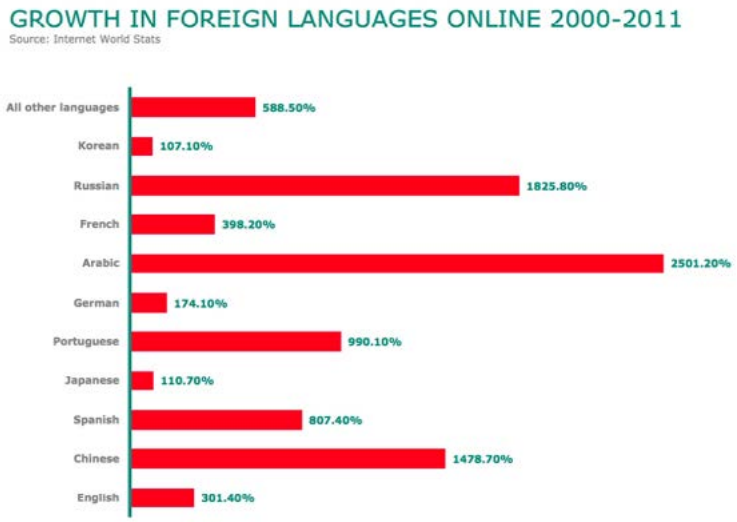
Introduction

A person who habitually speaks more than one language can be called a bilingual or multilingual whereas a person who writes in more than one script is bi-literate or multi-literate. A Google search returns more than 100+ million hits for bilingual but only 2,500 for bi-literate illustrating the lack of understanding of the diversity of writing systems globally. This is becoming an issue as technological advances (electronic, social media, texting) demand multi-literacy. Indeed, there has been a rapid increase in written languages used online: Arabic (2500+%), Russian (1825+%) and Chinese (1478+%) among others (see Figure 1).

Figure 1 – Growth in Text Online Reflecting the Plurality of Writing Systems Globally (Arno, 2011)[3]



Multiliteracy is important for digital citizenship globally but this is most acute in officially polyglot areas including China, Hong Kong and India. One goal of this paper is to introduce a conceptual framework to motivate research into the effects of multiliteracy on neurocognitive processing and ergo on healthy aging and levels of educational attainment in multiliterate environments. What is most intriguing about multi-literacy are questions about how our neural systems have adapted the mechanisms used to process more than one language (each with their own idiosyncrasies) in the brain (CHEE *et al.*, 1999; 2000; WEEKES, 2005; 2012) and whether this enhances cognitive reserve that is vital for healthy aging (ABUTALEBI *et al.* 2014, 2015a, 2015b, 2016) as well as educational policy (ASFAHA e KROON, 2011). Another goal of the paper is a re-conceptualisation of multi-literacy from a neurocognitive perspective in order to distinguish between bi-scriptal (different scripts learned) and di-scriptal (same script learned) bilingual speakers (who use different languages) and monolinguals who speak the same language and thus read the same script but may be bi-scriptal within their own language e.g. in Japanese. This new conceptual approach is necessary because multiscript literacy is determined by at least two constraints: the type of language (same family versus different family) and type of script (same script versus different script). A novel feature of the framework is the distinction between writing systems that are similar but not equivalent e.g. simplified and traditional characters in Chinese languages and Bokmål and Nynorsk in Norwegian languages - and how they represent their own language families. For example, Bokmål and Nynorsk di-scripts use Latin alphabets to transcribe a common language and both are written

[3] See: https://contentmarketinginstitute.com/2011/08/content-marketing-language-barrier/

phonetically. However, logographic characters used to write Chinese dialects are non-alphabetic and thus cannot be used to write different languages below the level of the syllable. This creates a barrier for adopting logographic scripts to write in a non-related language e.g. Chinese characters used to write Mongolian and Tibetan but not necessarily an obstacle e.g. Japanese and Korean use Chinese logographs. The key conclusion for policy purposes is that instruction in a non-native script as the medium of instruction creates difficulty for learning to read and write if their native language at home (or school) is taught in an opaque script e.g. learning to read and write Chinese characters when the home dialect is Hakka or Hokkien or even a language like Nepali.

1 Background

The focus of research on literacy is Indo-European languages that use an alphabetic script (e.g. COLTHEART *et al*, 2001; PLAUT *et al*., 1996; SEIDENBERG e MCCLELLAND, 1989; ZORZI; HOUGHTON; BUTTERWORTH, 1999). Such models can explain literacy in English, German (ZIEGLER; PERRY; COLTHEART, 2000), Italian (ZORZI, 2010) and Russian (ULICHEVA *et al*., 2015). Some models can also explain acquisition of literacy in monolingual speakers learning alphabets (DAVIES e WEEKES, 2005; WEEKES; DAVIES; CASTLES, 2007) and loss of literacy following brain damage (HRICOVÁ e WEEKES, 2012; SENAHA e PARENTE, 2012; SENAHA *et al*., 2006; WEEKES, 2007; WEEKES *et al*., 2012; WEEKES, *et al*., 2013). However, it is not clear if models extend to monolingual speakers learning non-alphabetic scripts (GUAN & WEEKES, 2019) and losing literacy through brain damage or even healthy aging (LEUNG, *et al*., 2012; WEEKES, 2000, 2005, 2010, 2012; WEEKES; CHEN; YIN, 1997; WEEKES; CHEN; LIN, 1998; WEEKES e CHEN, 1999; WEEKES *et al*., 2006a; WEEKES *et al*., 2006b; YIN e WEEKES, 2003; YIN; HE; WEEKES, 2005). Equally, such models are not well equipped to explain the acquisition and loss of literacy in bilingual mono-scriptal speakers (VAN HEUVEN *et al*., 2018; WEEKES *et al*., 2013; RAMAN e WEEKES, 2003; 2005a; 2005b; WILSON *et al*., 2007) or bi-scriptal, di-scriptal and multi-scriptal readers (CHERODATH, 2016; KAMBANAROS e WEEKES, 2013; WEEKES, 2005, 2012; WILSON; KAHLAOUI; WEEKES, 2012).

Paradis (1994) proposed a cognitive model of literacy for bilingual speakers. He reasoned that orthographic and phonological forms and syntactic constraints were language-specific whereas semantic representations are shared across language. However, no distinction was made between bilingual mono-scriptal (Dutch- English), monolingual bi-scriptal (Japanese), bilingual bi-scriptal (Chinese-English), di-scriptal monolingual speakers (Norwegian), and mono--scriptal bi-dialect speakers (Greek Cypriots). Kroll and colleagues assume separate lexica for L1 and L2 word forms that are connected via asymmetrical connections shaped according to the amount of exposure in each language with each set of word forms connected to a common semantic system (though see KROLL e DIJKSTRA 2002) that allows for different writing systems to have differential effects on reading (HOSHINO *et al*., 2008). These models of bilingual reading can be considered language specific i.e. lexica represent independent orthographic word forms that are specific to one spoken language. By contrast, language independent models of bilingual written word recognition assume that written and spoken word forms and their conceptual properties shared a common network for all languages (VAN HEUVEN *et al*., 2018).

The group of Bilingual Interactive Activation (BIA) models proposed by Dijkstra and colleagues are language independent (see also VOGA e GRAINGER, 2015). The BIA model was an extension of the Interactive Activation model of reading proposed by McClelland and Rumelhart (1981) and contains two layers of representation for unique features, letters and words in one written language. When a letter string is presented to the BIA model, visual input activates letter features at each letter position, which subsequently excite nodes containing features and inhibits the letters for which those features are absent. Activated letters excite word forms in both languages, whereas other words are inhibited (irrespective

of language). The BIA model can explain why the properties of written words from one language can have an impact on the recognition of words with similar orthographic form in a closely related language using the same alphabet (e.g. Dutch and English). This is because the BIA model assumes an integrated lexicon of orthographic word forms in both languages. One motivation for this assumption is the observation that identical orthographic forms without any conceptual overlap in meaning (called interlingual homographs) have an inhibitory effect on visual word recognition in the other language e.g., Dijkstra *et al*. (2002) found Dutch-English speakers were slower to accept an interlingual homograph **e.g.,** room (which means cream in Dutch) as an English word than to decide that a non-homograph word (e.g., voom) is not. The effect is asymmetrical i.e. mostly in the second language. Marian and Spivey (2003) report shared phonemic features between English and Russian impact on processing of Russian-English speakers. These effects have been reported in monolingual speakers who read two different scripts i.e. bi-scriptals e.g., Rastle and Havelka (2005) report influences of Cyrillic on reading of Latin script in Serbo-Croatian speakers. Similarly, Rastle *et al*. (2009) report effects of length on the reading of Kanji words that were written in kana script by bi-scriptal (monolingual) Japanese speakers. Such findings converge on the view that orthographic word forms are not language specific in a lexicon for bilingual or monolingual speakers who speak languages that share an alphabet (Dutch and English) or the language family (Indo-European) with different alphabetic scripts (Latin and Cyrillic) and non-alphabetic scripts (Kana and Kanji). The dominant view is - regardless of language - script is redundant to the mapping of orthography to phonology and vice versa. The BIA+ models can potentially explain reading (and writing) disorders in bilingual readers (WEEKES, 2012). The assumption of integrated lexica predicts disruption to oral reading will be non-selective and produce an equivalent pattern of errors in both languages, particularly if two scripts are similar. Cross-linguistic reading errors in bilingual speakers with acquired dyslexia suggest that damage to reading and writing is non-selective and language independent (BÉLAND e MIMOUNI, 2001; BYNG *et al*., 1984; DRUKS *et al*., 2012; ENG e OBLER, 2002; RAMAN e WEEKES, 2003, 2005a; 2005b; WEEKES, 2007; WILSON *et al*. 2012). Sasanuma and Park (1995) report Korean-Japanese speakers with a selective impairment writing Hangul and others with Katakana. Raman and Weekes (2005) report a case of deep dysgraphia in Turkish and English (L2) characterised by impairment to non--word spelling, written picture naming in both languages and poor spelling of homophones in L2 only. Raman and Weekes proposed that in cases of bilingual deep dysgraphia result the non-lexical phonological route for spelling is destroyed (WEEKES e RAMAN, 2008).

Raman and Weekes (2005) proposed a language independent account of bilingual dysgraphia i.e. that a common set of neural pathways is used to spell both languages and spelling is not constrained by the specific linguistic properties of one language only. This account assumes that the spelling words and nonwords across languages relies on a common network and, if the network is damaged, similar patterns of dysgraphia in both languages. Although not implemented as such, an (inverted) BIA framework could explain these phenomena (WEEKES, 2012; WILSON *et al*., 2012). Kambanaros and Weekes (2012) tested this hypothesis directly with a Greek Cypriot-English case who had acquired phonological dysgraphia when spelling nonwords in Greek and English. As in other cases of phonological (and other) dysgraphias reported across languages (WEEKES, 2005), there was an effect of grammatical class on spelling (typically nouns spelled better than verbs). Surprisingly, for this case, spelling of Greek verbs was better than Greek nouns whereas the opposite pattern was observed in English (L2). Differential effects of grammatical class on acquired dysgraphia indicate that phonological dysgraphia is a lexical event. Effects seen across scripts suggest that these cognitive processes in spelling are not constrained by the unique

linguistic properties of a writing system (WEEKES, 2005). However, dissociations between writing systems in a case of bi-scriptal dysgraphia are not compatible with the language independent account (RAMAN e WEEKES, 2005). Therefore, our thinking about the universality of writing errors across scripts may need revision at least for bi-scriptal spelling in writing systems that are from different language families. In a similar study, Weekes, Kambanaros, Messinis and Anyfantis (2012) observed greater difficulty retrieving written object names than written action names in Greek - with no differences in English - challenging the language independent hypothesis. Furthermore, written word naming was better than spoken word naming in both languages showing that - although there was a task effect - linguistic dissociations were not due to task difficulty as that variable would be expected to have an interactive effect. It is notable that Greek Cypriot speakers use the same script as other Greek speakers, but they pronounce letters according to the Cypriot dialect. This distinguishes them as di-scriptal not bi-scriptal (like Japanese speakers).

It has been argued that Greek Cypriots (who may be called bi-dialectal speakers) have a cognitive advantage (ANTONIOU *et al*., 2015). However, it is not certain that spoken language (code) switching is the reason for this advantage. An alternative hypothesis is that, because Cypriot and Modern Greek alphabets are similar, and literacy in a similar alphabet depends on dialect (WASHINGTON, 2019), any advantage may stem from a greater requirement to use cognitive control to transliterate mappings from orthography (or vice versa) to read and spell alternative (competing) spoken word forms in Cypriot and Greek 'dialects'. Cantonese-Mandarin speakers resemble this linguistic constraint because, although the spoken languages are in fact languages (not dialects), the non-alphabetic script is common in both languages (albeit simplified in Putonghua or standard Chinese) and in a number of other Chinese dialects that form the Yue or southern Min languages (and others). Turkish Cypriot speakers who speak standard or variant Turkish and can often read in English, Greek and Turkish (all alphabetic systems) and extinct generations who used Arabic script for commercial, ideological or religious purposes are examples of multi-scriptal, multilingual speakers - who are instructive for conceptualising literacy (WEEKES & RAMAN, 2008).

There are other examples throughout the scriptal-sphere. Norwegian speakers are a unique case but illustrative. Bokmål literally book tongue is an official written standard in the Norwegian language, alongside Nynorsk. Bokmål - derived from Danish colonisers - is the preferred written standard of spoken Norwegian in 85% to 90% of the Norwegian population today. However, similar to all other alphabetic hegascripts imposed by the literary class upon the (historically) less educated local population, resistance to Bokmål has intensified outside of Oslo (formerly Kristiania) and in the now wealthier Atlantic coastal regions. Unlike languages that have imposed rules for pronunciation of the standard (UK Queen's English also Italian), there is no national standard on pronunciation of Bokmål in Norway (reflecting resistance). Riksmål is another written standard nurtured by the non-governmental Norwegian Academy of Language and Literature but is hardly used. Both written standards are Norwegianised varieties of Danish language.

Literacy in Cypriot Greek, Norwegian and Turkish-English speakers resembles effects of dialect on literacy in English. For all groups, standard writing is imposed on a dialect and marginalised speakers - with less access to spoken and written standards - typically will struggle to communicate despite intensive encouragement and motivation. This is true in all scripts that are imposed as the standard throughout a sphere of influence e.g. Arabic, Chinese, Latin, and speakers of dialects that are referred to as English, French, German and Spanish. Many of these speakers are guided to pronounce digraphs and diphthongs uniquely according to dialect but this is not evident in dominant English speaking environments e.g. US. Given that scripts can be embellished using diacritic markers then read aloud and written to communicate, script is obviously a flexible adaptation of knowledge to the local linguistic environment.

Writing systems are indeed a reflection of the spoken language that adopts them. Historical contact between languages requires codification for commercial, ideological, literary and religious purposes. Letters, numerals and other symbols are typically useful a specific purpose - transmission of knowledge and cultural treasures only if they deliver a return. Writing systems are also imperfect in terms of the language spoken in a majority of colonised language environments whether monolingual, bilingual or multilingual in modern writing systems. Embellishments of the dominant script to fit a colonised linguistic environment have always had the purpose of capital flow, knowledge transmission and power but it is an open question if cognitive or neural representations of these invented cultural artefacts are realised in the brain and mind (see **Figure 2**).

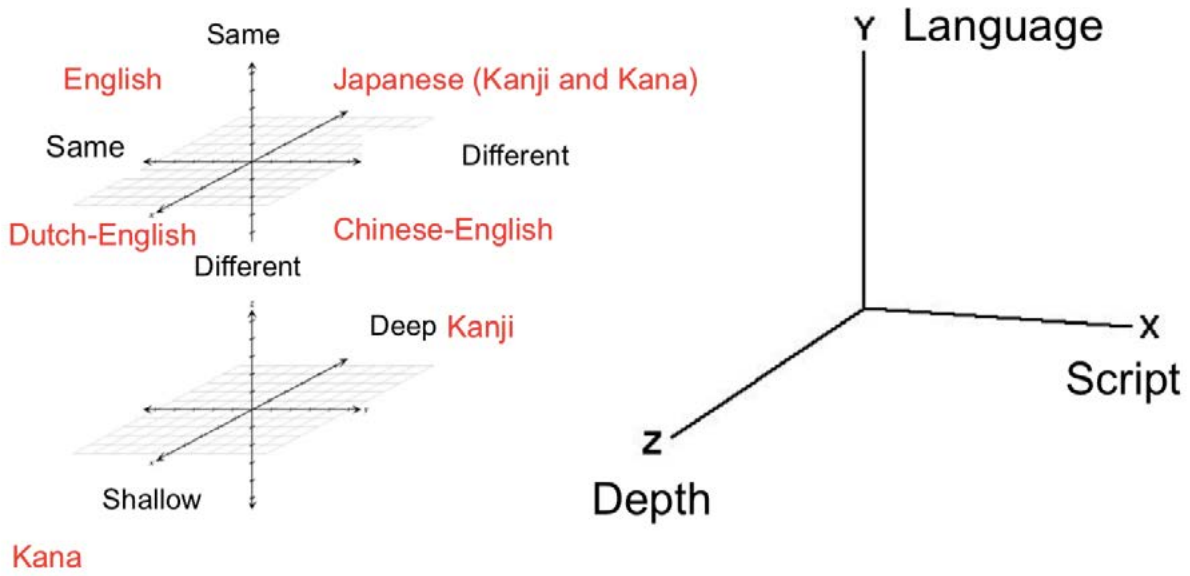
Figure 2 – How cognitive and neural representations of multi-scriptism might be realised in the mind (Weekes).

2 Research question

One relevant research question is: Are the cognitive control regions implicated in the production and switching between languages in bilingual speakers active when multi-literates switch between writing systems during the translation of words and sentences? In other words, do the brain regions used for cognitive control also influence the orthographic processing of bilingual multi-literates and if so how does this contribute to cognitive reserve and ergo healthy aging of seniors along the Silk Route? In order to address this question, several conceptual questions arise. First how is multiliteracy defined? Biscriptalism accompanies bilingualism if spoken languages use different writing systems even if both writing systems are alphabetic. Thus, if a native English speaker learns Russian, she will most likely become bi-scriptal in Latin and Cyrillic alphabets. However, if a student is a native English speaker who learns Dutch, he will not be biscriptal as both languages use a Latin alphabet and actually share homographs. Such readers can be called bilingual di-scriptals. A person can also be di-scriptal in their native language if more than one writing system is used e.g. Japanese and monolingual bi-scriptals are another. Contemporary Chinese writing systems can also be considered di-scriptal: Traditional characters are used in Taiwan, Hong Kong, Macau and in parts of Guangdong whereas Simplified characters used in Mainland China and Singapore (di-scriptalism). However, Latin writing systems are used to transcribe syllables forming invented scripts i.e.

alphabetic writing with embellishments for tone in Mainland China (called pinyin). Multi-scriptalism is thus a poly-dimensional construct that can be conceptualised using dimensions that are intralingual (one language) and interlingual (two languages). A framework for multi-scriptalism presented in Figure Three can be used to conceptualise script diversity according to spoken language similarities and for testing hypotheses about literacy in monolingual, bilingual and multilingual speakers (WEEKES, 2005, 2012).

Figure 3 – Conceptual framework for understanding multilingualism and multiscriptalism



Source: The author

One linguistic question that can be derived from this framework is whether multiscriptalism is constrained by similarities within a spoken language family e.g. should both the scripts for a native Japanese speaker be considered Sinitic writing systems? For a Putonghua speaker in Mainland China or in Singapore, writing systems contrast as Latin (pinyin) and Sinitic (simplified characters). In Taiwan, a Putonghua speaker might learn two scripts from distinct writing families (Latin and Sinitic) but the characters are 'traditional'. In Hong Kong, a Cantonese speaker rarely uses a Latin system to become literate in Chinese but can be mono-scriptal - learning traditional Chinese characters but also very likely to acquire literacy in the English spoken language using an alphabet (although this is diminishing) this being a bilingual bi-scriptal. In Guangdong Province, it is typical for Cantonese speakers to acquire literacy through spoken Putonghua and they may therefore be required to learn both pinyin, simplified and traditional Chinese characters thus creating the possibility of a multiliterate bilingual and if a European language is also then acquired, a multiliterate, multilingual. Such multiliterate multilinguals are plentiful throughout Asia. For example, Devanagari writing systems are standard in India but have also been exported throughout South-East Asia (RAMANUJAN e WEEKES, 2019) as shown in **Figure 4**. Migrations of writing systems along the Silk Sea Routes aka the "Maritime String of Pearls" are displayed in **Figure 5** and **Figure 6**.

Figure 4 – Evolution of alphabets along the Old Silk Land and Sea Routes - Boeree, 2020[4]

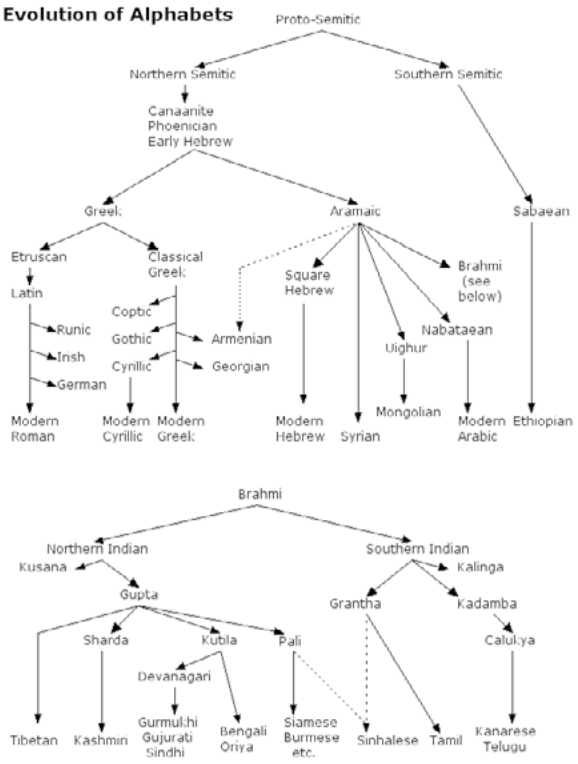
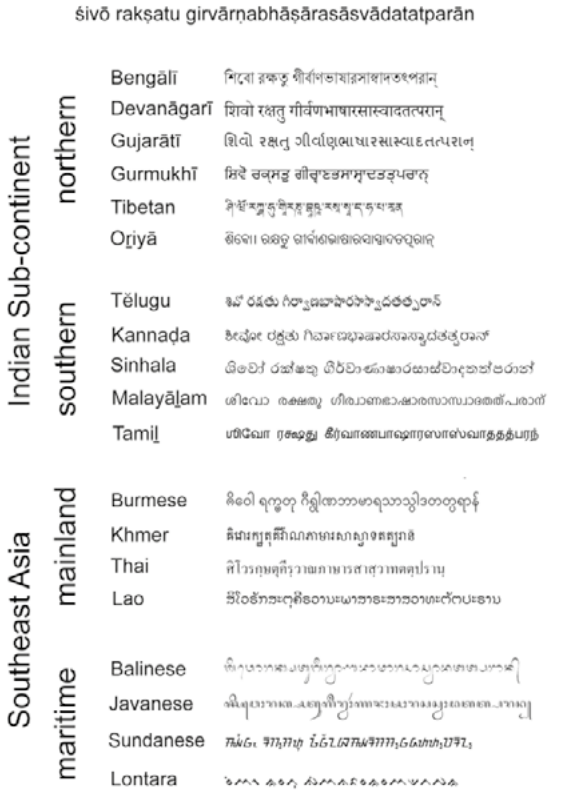


Figure 5 – Scripts around the Silk Sea Routes also called the String of Pearls[5]

Figure 6 – Migrations of script along Silk Sea Route also called the String of Pearls[6]



Source: Wikipedia, 2020, https://en.wikipedia.org/wiki/Abugida

Other combinations of spoken and written languages in Eurasia are more exotic e.g. multi-script multilinguals who read Arabic, Latin and Sanskrit scripts in their native language (Hindi) and one or more other languages (Bengali, Urdu). Interestingly, super-literacy is also found in Balkan countries where four or even five scripts (Arabic, Cyrillic, Greek, Latin) may be learned (see Figure One) and in Northern Iran where Turkish-Persian, Azari and Turkish speakers are plentiful (this is just one example of hundreds though Eurasia). As in many of the colonised regions of Eurasia, Azari and Turkish speakers have no literary standard of their own they only exist as a spoken language. But that is not to say these speakers are not literate. Although there is no language specific script available for these individuals, the medium of instruction throughout Iran in Persian. Therefore, Turkish speakers learn

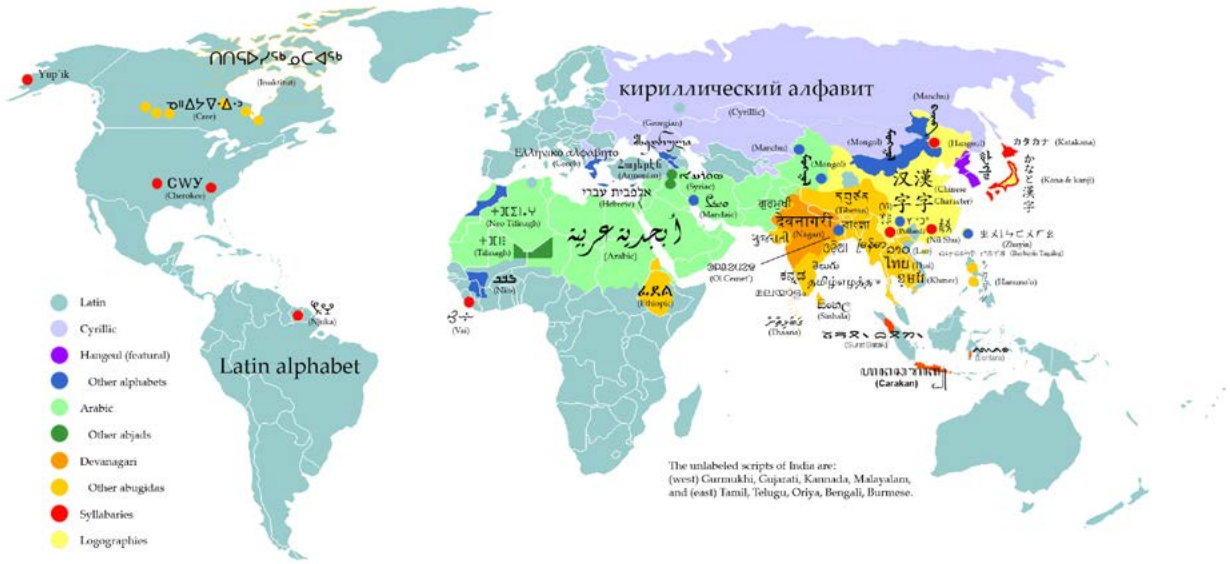
4 See: http://webspace.ship.edu/cgboer/evolalpha.html
5 Figure taken from Mishra, 2016, https://www.storypick.com/the-letter-ka/.
6 Figure taken from Wikipedia, 2020, https://en.wikipedia.org/wiki/Abugida.

via Persian which itself uses a borrowed Arabic script (despite being an Indo-European language) to read and write in Turkish. The key message in this paper is that this is the norm in multiliterate linguistic environments throughout Asia - and the conceptual framework extends beyond the One Belt One Road. In fact spoken and written language contact was pervasive along the Old Silk Routes (both Land and Sea) for millennia. Take Georgia, as just one example multiple where spoken languages were combined with (now extinct) scripts (Asomtavruli, Nuskhuri and Mkhedruli, Cyrillic and Latin) reflecting the unique geopolitical position of this region as a junction for commerce, education and religion. Reflecting this historical fact, combinations of writing systems can now be seen in all nations in the New Silk routes e.g., Abjads, Armenian, Greek, Gurmukhi, Hebrew, Manchu, Mandaic, Mongol, Syriac, Tibetan and the 'hegascripts' of Arabic, Chinese, Cyrillic and Latin. Moreover, spoken language contact creates 'official' multi-scriptalism in a handful of cases. The classic is Ptolemaic Egypt that was institutionally bilingual and multi-scriptal so that at least three scripts were recorded: Egyptian Demotic, hieroglyphics and Ancient Greek.

Although some scripts along the OBOR/String of Pearls are derived from a common spoken language, it is far more typical to find writing systems are imposed onto a native language without a direct link to the sounds of a native language at all e.g. Persian (BAKHTIAR e WEEKES, 2015). Inequalities in literacy for a nonnative tongue can thus be linked to the Education for All (EFA) movement as part of UNESCO initiatives incorporating the Year of the Endangered Language (2019). Elimination of global and local inequalities is a principle that is guiding these initiatives but multi-literacy is much neglected (NAG *et al.*, 2012). Indeed, for monolingual speakers who use a 'dialect' or speak a non-dominant language at home, multi-literacy has been demonised as a threat to learning (undermines scholastic achievement/EFA goals) by governments and researchers globally. Teaching multiple scripts is considered negative in mainstream education. International agencies e.g. UNESCO must redefine multi-literacy as an opportunity not a threat. This is timely given that literacy is an economic and geopolitical imperative and multiliteracy adding resource to human capital with interesting consequences for contact along OBOR (Figure Seven).

3 Future research questions

Figure 7 – Writing Systems of the World Today[7]



[7] See Wikipedia, 2020, https://en.wikipedia.org/wiki/List_of_writing_systems

One contention is that multi-literacy may deliver advantages beyond educational achievement in terms of preserving cognitive reserve that is vital for healthy aging. There is no argument that these benefits must be investigated given that multi-literacy - in the digital age - is essential for commerce, education, politics and trade most especially for Chinese seniors who are recognised as early adopters of technology. Results of these investigations contribute to EFA goals and UNESCO priorities. My recommendation is to report examples of cross-script comparisons in acquired dyslexia and dysgraphia (WEEKES, 1996; 1999; 2000; 2005; 2012; 2019; WEEKES *et al*., 1997; 2009; 2011; 2013; WILSON *et al*., 2012; Figures Three to Six).

3.1 Routes and Roads

There is scope for further research given widespread language contact along the Old Silk routes and the diversity of writing systems in OBOR. We have identified cases of multi-scriptal dyslexia and dysgraphia in China and have broadened catchment to cases in OBOR locations and studied the brain mechanisms for multi-literatism in bi-scriptal Chinese-English speakers (CHEE *et al*., 1999; 2000) as well as in acquired communication disorders in several languages. Green's (1986) Inhibitory Control (IC) model offers one motivation to study bi-scriptal speakers as a test of the language control hypothesis (ABUTALEBI e GREEN, 2007). Briefly, The language control system is assumed necessary for selection of lexical representations in bilingual discourse and thus potentially explains literacy in more than one language. However, literacy is more than just word retrieval and word production. For multi-literate individuals, literacy can involve switching between oral language and writing systems i.e. orthographies and scripts in everyday life - particularly in the educational context.

Conclusion

It is perhaps irreverent to claim nothing has changed in script contact throughout history but at the same time technology has delivered innovations and therefore new questions for the 21st century. Again, this is seen in all phases of evolution of writing systems. During the late 20th century, qwerty keyboards were designed to add extra characters (ñ, ç) and diacritics (accents) that were used for differentiating scripts in English, French, Portuguese and Spanish but even in countries using the same alphabet such as English and French, keyboards were configured uniquely to become a signature of nationhood. The Sino-Tibetan family of languages were more challenging to transcribe onto qwerty keyboards but this problem was ultimately solved with software. The early 21st century has seen a revolution in texting for communication (arguably the dominant means of communication). This has revived the issue of scriptal contact and projects it into the foreground for AI and advanced technologies. Along the Old Silk Routes, the plurality of languages and scripts is converging into the romanisation of electronic communication – although this is not necessarily an inevitability. What is clear is that script has implications for security, strategy and sustainability of the OBOR and String of Pearls.

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