

THE CHINESE LANGUAGE BETWEEN ARABIZATION AND LOCALIZATION: A NEUROPHYSIOLOGICAL PERSPECTIVE

اللغة الصينية بين التعريب والتوطين: منظور فيزيولوجي عصبي

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ABSTRACT

This research attempts to address the linguistic and cultural dynamics involved in the transfer of the Chinese Language into the Arab World, highlighting the dichotomy between “Arabization” (Ta’reeb) and “Localization” (Tawteen). As Sino-Arab relations witness a rapid growth in economic, political and educational spheres, the need for effective linguistic mediation has become vital. To this end, the current research seeks to analyse the methodologies used to teach Chinese to Arabic speakers and translating the target language concepts into Arabic attempting to pursue the transparency of current translation practices as whether leaning towards mere linguistic transliteration (Arabization) or towards deep cultural adaptation (Localization). The research is theoretical in nature where it bridges among different disciplines by investigating a corpus of translated literary works and media discourse. It is sought to highlight the challenges posed by the distinct Chinese tonal nature and the logo-graphic writing system through the lens of neuroplasticity and cortical adaptation. The study findings gears towards putting forward brain-based learning strategies to enhance neural embedding (localization) of Chinese in the Arab learners’ cognitive architecture.

Keywords:

Arabization vs. Localization, Brain Plasticity; Chinese Language Acquisition, Neurolinguistics.

ملخص

يسعى هذا البحث إلى معالجة الديناميات اللغوية والثقافية المرتبطة بنقل اللغة الصينية إلى العالم العربي، مع إبراز الثنائية القائمة بين «التعريب» و«التوطين». ومع ما تشهده العلاقات الصينية-العربية من نمو متسارع في المجالات الاقتصادية والسياسية والتعليمية، أصبحت الحاجة إلى وساطة لغوية فعالة أمرًا بالغ الأهمية. وفي هذا الإطار، يهدف البحث الحالي إلى تحليل المنهجيات المعتمدة في تعليم اللغة الصينية للناطقين بالعربية، وفي ترجمة مفاهيم اللغة المهدف إلى العربية، وذلك سعيًا إلى الكشف عن مدى شفافية الممارسات الترجيحية الراهنة، وهل تميل إلى مجرد النقل الصوتي اللغوي (التعريب) أم إلى التكيف الثقافي العميق (التوطين).

يعتمد البحث المنهج الوصفي من خلال دراسة عينة من مدونة من الأعمال الأدبية المترجمة والخطاب الإعلامي. ويركز على التحديات التي تفرضها الطبيعة النغمية للغة الصينية ونظامها الكتابي اللوغوغرافي، وذلك من منظور المدونة العصبية والتكيف القشري؛ إذ يكشف عن كيفية انتقال الدماغ من القراءة الخطية القائمة على التركيب في اللغة العربية إلى المعالجة البصرية-الفراغية الشمولية التي تتطلبها اللغة الصينية.

وتتجه نتائج الدراسة إلى اقتراح استراتيجيات تعلّم قائمة على الدماغ من شأنها تعزيز الترسخ العصبي (التوطين) للغة الصينية ضمن البنية المعرفية للمتعلمين العرب.

الكلمات المفتاحية:

اكتساب اللغة الصينية، التعريب مقابل التوطين، المدونة الدماغية، اللسانيات العصبية.

1. INTRODUCTION

The intensification of Sino-Arab relations over the last two decades has transformed the linguistic landscape of both regions. What was once a peripheral linguistic exchange has evolved into a strategic communicative necessity, driven by economic cooperation, political partnerships, cultural diplomacy, and educational mobility (Zhang & Lu, 2019). Within this context, the Chinese language has emerged as a critical medium through which knowledge, power, and cultural narratives circulate (Sun, 2006). Yet the growing presence of Chinese in Arab educational institutions and media has exposed fundamental tensions regarding how this language is introduced, processed, and ultimately internalized by Arabic-speaking communities (Al-Said, 2018).

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Central to this challenge is a longstanding dichotomy within Arab linguistic thought: Arabization (Ta'rib) versus Localization (Tawṭīn) (Al-Khūlī, 1982; Esselink, 2000). Arabization, historically associated with lexical borrowing and phonological adaptation, prioritizes the domestication of foreign linguistic forms within Arabic structures (Hatim & Mason, 1997). Localization, by contrast, seeks deeper cognitive and cultural embedding, enabling the foreign language to function independently within the learner's mental architecture (Li, Legault, & Litcofsky, 2014; Abutalebi & Green, 2016).

This distinction seems to become particularly significant taking Chinese as a case of study, a language whose phonological, orthographic, and semantic systems diverge substantially from Arabic (Perfetti, Liu, & Tan, 2005; Tan et al., 2005). As highly notable, Chinese employs lexical tone, isolating morphology, a logographic script, and high contextual dependency, all of which challenge Arabic speakers' conventional linguistic and cognitive strategies (Wong et al., 2007; Zatorre & Gandour, 2008). Consequently, simple translation or Arabization is insufficient; understanding the process requires an integrated perspective that combines applied linguistics, translation studies, and neurolinguistics. Despite the theoretical prominence of these paradigms, relatively little research has pursued the issue of how these strategies manifest at the neural level during L2 acquisition of Chinese, particularly among adult learners whose first language utilizes alphabetic writing systems. Chinese's logo-graphic script and lexical tones seem to require distinct neural processing strategies compared to alphabetic systems; logographic reading engages bilateral occipito-temporal networks and demands visuospatial recognition, while tonal processing recruits auditory regions specialized for pitch discrimination (Perfetti, Liu & Tan, 2005; Wong, Gauthier, Woroch, DeBuse & Curran, 2005). We believe that without targeted instructional strategies, Arab learners might fall in a struggle to transition from L1-mediated processing to direct engagement with

Chinese orthography and phonology, and potentially engendering an increased cognitive load and slower proficiency gains.

Recent neurocognitive research provides critical insights into this process. For example, a study by Song, Jiang, Maurer, and Li (2024) used event-related potentials (ERPs) to investigate how adult L2 learners develop neural print tuning for Chinese characters, a neurophysiological marker of fluent reading (N170 component) that reflects sensitivity to orthographic regularities (Bentin, Mouchetant-Rostaining, Giard, Echallier & Pernier, 1999; Maurer, Brem, Kranz, Bucher, Benz, Halder & Brandeis, 2006). They found that beginner adult learners exhibited coarse neural tuning (a bilateral increase in N170 amplitude in response to real Chinese characters compared to non-print stimuli), whereas intermediate learners demonstrated fine tuning and left-lateralized N170 effects, indicating deeper orthographic sensitivity and more mature neural specialization (Song et al., 2024). Crucially, these neural indicators correlated with measures of reading fluency, vocabulary knowledge, and morphological awareness, suggesting that the emergence of localized processing mechanisms is linked to cognitive and linguistic proficiency.

These findings tend to underscore the importance of examining Chinese L2 acquisition not merely through behavioral or pedagogical lenses, but through an interdisciplinary approach that integrates neurolinguistics, cognitive psychology, applied linguistics, and translation studies. Understanding how Arabic speakers neurologically process Chinese script and sound systems is more promisingly to allow educators to design instructional methods that align with the brain’s natural learning trajectory, promoting efficient and sustainable language acquisition.

This study is aimed at advancing the theoretical and empirical understanding of how Arab learners negotiate the cognitive and neural demands of Chinese logographic and tonal systems. Specifically, it investigates, through the lens of

Arabization and Localization, how neural processing of Chinese evolves with proficiency and what pedagogical implications these patterns hold for instructional design and translational practice (Lakoff & Johnson, 1980; Pym, 2014).

2. Conceptual Framework: Arabization vs. Localization

2.1 Arabization (Ta' rīb): Linguistic Mediation via L1

Arabization, or *Ta' rīb*, has historically functioned as the primary mechanism through which foreign linguistic and cultural content is adapted to Arabic contexts (Al-Khūlī, 1982). From the Abbasid translation movement to modern pedagogical practices, Arabization involves the phonological, morphological, and semantic mapping of foreign elements onto familiar Arabic structures (Hatim & Mason, 1997; Al-Said, 2018). In the context of Chinese language acquisition, Arabization manifests in multiple ways. First, phonological approximation whereby learners attempt to pronounce Chinese words by mapping Chinese tonal patterns onto Arabic intonation rules (Li et al., 2014). Second, transliteration which relates to characters being converted into Arabic letters to facilitate reading, which helps beginners recognize words but preserves reliance on L1 decoding (Wong et al., 2007). Third, Arabic-mediated grammatical explanations through which Chinese syntax and morphology are explained by analogy to Arabic grammar, reinforcing L1 conceptual frameworks (Zhang & Lu, 2019).

While Arabization seems to facilitate initial comprehension and reduces anxiety, relevant research indicates that it can increase cognitive load, slowing the development of independent processing in the target language (Abutalebi & Green, 2016; Sweller, 2011). ERP studies support the present claim: Arab L2 learners relying heavily on transliteration show weaker N170 tuning to Chinese characters, indicating that their neural circuits remain largely dependent on L1 phonological and

semantic networks (Song et al., 2024). Implying that the process of arabization represents a surface-level strategy, although it may enhance short-term learning efficiency, it risks producing a *L1-mediated mental representation* of Chinese that constrains deeper cognitive integration. The counter process to arabization is popularly coined with localization as will be unveiled in the following section.

2.2 Localization (Tawṭīn): Direct Cognitive Embedding of L2

Localization (*Tawṭīn*) involves strategies that allow learners to process Chinese directly, without mediation through Arabic. It emphasizes the formation of new neural pathways that encode phonology, semantics, and orthography within L2-specific circuits (Li et al., 2014; Abutalebi & Green, 2016). The main Characteristics of Localization can be echoed through the following strategies: direct character engagement through which learners read and practice characters without transliteration, encouraging visuospatial cortical adaptation (Perfetti et al., 2005; Tan et al., 2005).Tonal discrimination training which lays the focus on auditory exercises promote activation of pitch-sensitive cortical regions, essential for lexical tone perception (Zatorre & Gandour, 2008; Wong et al., 2007). Semantic mapping independent of L1 based on which learners form direct associations between characters and meaning, by passing Arabic semantic mediation (Lakoff & Johnson, 1980; Song et al., 2024).

Neurocognitive evidence shows that advanced learners who practice Localization demonstrated left-lateralized N170 tuning and improved behavioral fluency (Song et al., 2024). This indicates efficient cortical specialization, reflecting a true internalization of Chinese orthographic and phonological structures. Localization, thus seems to align with cognitive load theory principles, reducing extraneous processing by passing L1 mediation (Sweller, 2011).

Essentially, localization is assumed to foster deep L2 integration, enabling learners to access Chinese words, tones, and syntax directly, which is predictable to promote long-term retention and cognitive efficiency.

2.3 Arabization vs. Localization

Lagging beyond being strictly binary, both processes of Arabization and Localization can be conceptualized as points along a cognitive and pedagogical continuum (Zhang & Lu, 2019). For instance, novice learners may initially require Arabization scaffolding, which causes lowering the entry barriers and reduces anxiety. However, prolonged reliance on L1 mediation is claimed to impede progression toward Localization, preventing the establishment of specialized neural networks for Chinese (Abutalebi & Green, 2016; Li et al., 2014).

3. Literature Review

Understanding how adult second-language learners process Chinese logographic script demands an integration of research from reading science, cognitive neuroscience, and second language acquisition. Unlike alphabetical systems, logographic writing such as Chinese seems to impose unique demands on visual, phonological, and semantic processes, engaging neural mechanisms that differ substantially from those used to read alphabetic languages (Perfetti et al., 2005; Tan et al., 2005). The related literature on bilingualism and neural print tuning, especially in adult L2 learners, has recently grown, offering critical insights into how the brain adapts to Chinese orthography highlighting cognitive factors that either enhance or hinder such adaptation.

3.1 Neural Print Tuning and ERP Evidence in Chinese L2 Learning

A seminal contribution to the relevant literature is the study by Song, Jiang, Maurer, and Li (2024), which used event-related potentials (ERPs) to investigate neural tuning for Chinese characters in adult L2 learners from alphabetic backgrounds. ERPs provide fine-grained temporal data revealing how the brain responds to different categories of visual stimuli.i.e., an ideal method for tracing the emergence of script-specific neural sensitivity during reading acquisition. In the study, neural responses were recorded from 48 adult Chinese L2 learners and 23 native Chinese readers as participants viewed various types of stimuli: real Chinese characters, pseudo-characters, false characters, stroke combinations, and line drawings. The primary neural marker of interest was the N170 component, a negative potential peaking between 160 and 200 ms after stimulus onset over occipito-temporal regions, widely understood as an index of visual word tuning and orthographic expertise (Bentin, Mouchetant-Rostaining, Giard, Echallier & Pernier, 1999; Maurer, Brem, Kranz, Bucher, Benz, Halder & Brandeis, 2006).

The study findings reveal that beginner L2 learners exhibited larger N170 amplitudes in response to real characters than to simple stroke combinations across both hemispheres, indicating coarse neural print tuning even at early stages of acquisition. However, this tuning was bilateral and not strongly specific to orthographic structure, suggesting that initial sensitivity reflects broad visual differentiation rather than refined character specialization. By contrast, intermediate L2 learners showed both coarse and fine neural tuning, with significantly larger N170 responses not only to real characters versus stroke combinations but also to pseudo-characters versus false characters, a classic marker of orthographic regularity sensitivity. Importantly, in intermediate learners the N170 response was left-lateralized, paralleling patterns observed in native readers and indicating the emergence of more efficient, specialized processing circuits for Chinese orthography. These ERP findings tend to associate with broader work suggesting that neural

specialization develops with experience: skilled readers show robust left-lateralized N170 enhancements for script-specific stimuli, whereas novices show weaker, more bilateral responses (Maurer et al., 2005; Zhao, Kipp, Gaspar, Maurer, Weng, Mecklinger & Li, 2014). The transition from bilateral to left-dominant neural activation reflects a shift from general visual processing to script-specific expertise, indicating that learners’ brains gradually reorganize in response to sustained exposure and practice.

3.2 Cognitive Correlates of Neural Tuning

The correlations observed in Song et al.’s (2024) data further strengthen the argument that neural tuning is not simply a by-product of exposure but is tied to specific linguistic and cognitive skills. Individual differences in print-tuning effects were moderately associated with measures of reading fluency, vocabulary knowledge, and morphological awareness, suggesting that learners who have stronger semantic and lexical knowledge are more likely to show more pronounced neural sensitivity to script characteristics. Such a pattern resonates with research in alphabetic contexts showing that reading fluency and phonological processing predict neural specialization for print (McCandliss, Cohen & Dehaene, 2003; Eberhard-Moscicka, Jost, Raith & Maurer, 2015). In the Chinese context, morphological awareness (an understanding of how characters combine into lexical units) appears particularly important, reflecting the logo-graphic and morphemic nature of Chinese where meaning often resides in character radicals and semantic components.

4. Neurolinguistic Foundations of Second Language Processing

Neurolinguistic research has long established that second language (L2) acquisition involves functional and structural brain reorganization, particularly when the target language differs typologically from the learner’s first language (L1) (Abutalebi & Green, 2016; Perani & Abutalebi, 2005). According to the Adaptive Control Hypothesis, bilingual language processing is found to be recruiting a dynamic network of cortical and sub-cortical regions responsible for cognitive control, language selection, and inhibition (Green & Abutalebi, 2013). These mechanisms are claimed to become especially salient when learners encounter a language such as Chinese, whose orthographic and phonological systems diverge radically from Arabic.

Arabic, as a consonantal alphabetic system, is assumed to rely heavily on ,c; temporal sequencing, and morphological root-pattern recognition (Boudelaa & Marslen-Wilson, 2015). Adversely, Chinese is considered as a logo-graphic and morphosyllabic system, where meaning is encoded visually and phonology is only partially recoverable from orthography (Perfetti, Liu, & Tan, 2005). As Dehaene (2009) argued, learning to read any script involves the “recycling” of pre-existing neural circuits; however, the degree of adaptation required increases with typological distance. For Arabic speakers, the learning process pertinent to Chinese necessitates extensive cortical reorganization rather than simple extension of existing reading networks.

4.1 Neural Architecture of Chinese Character Processing

Neuroimaging studies have consistently shown that Chinese character recognition activates a distributed bilateral network involving the occipital, temporal, and frontal lobes (Tan et al., 2005; Liu et al., 2008). Unlike alphabetic reading,

which is strongly left-lateralized, Chinese reading engages:the left middle frontal gyrus, associated with working memory and visuospatial integration. The bilateral fusiform gyrus, especially the Visual Word Form Area (VWFA), responsible for orthographic recognition. The right hemisphere, reflecting heightened visuospatial demands (Tan et al., 2005). In this respect, Perfetti and colleagues (2005) argue that Chinese characters require simultaneous access to orthographic form, phonology, and semantics, rather than sequential decoding. This “triangle model” of Chinese reading places heavy demands on visual analysis and semantic retrieval, processes that are less dominant in Arabic reading.

Conversely, For Arabic L2 learners, this neural configuration seems to pose a fundamental challenge which associate with their L1 reading network in a way that is optimized for sequential, phonology-driven decoding, not holistic visual pattern recognition. Therefore, it is highly plausible to take the stance on that without a targeted instructional intervention, learners would default to L1-mediated strategies, reinforcing Arabization at the neural level.

4.2 Arabization as L1-Mediated Neural Processing

Holding for the view of that learners rely on transliteration, Arabic glosses, or phonological approximation, it would be quite plausible to culminate to the position that Chinese input is processed via Arabic phonological and semantic networks (Li et al., 2014). This would result in an increased activation of working memory circuits, greater cognitive load (Sweller, 2011), weaker orthographic tuning in the VWFA and persistent bilateral N170 responses. Such patterns allocate with the plausible indication that Chinese is not being internalized as an autonomous system but rather filtered through Arabic cognitive structures.

4.3. Localization as Neural Specialization

Localization, by contrast, facilitates direct neural access to Chinese representations. As Abutalebi and Green (2016) argued, sustained L2 use without L1 mediation promotes neural efficiency and automaticity. In Chinese, this manifests as strengthened visuospatial processing in occipito-temporal regions, enhanced tonal discrimination in auditory cortex (Zatorre & Gandour, 2008) Left-lateralized N170 tuning, and educed reliance on executive control networks. Localization, can be represented not only as a pedagogical strategy but a neurological endpoint of successful L2 acquisition.

5. Methodology

5.1 Research Design

The present study opts for a descriptive qualitative design supported by neurocognitive and linguistic evidence drawn from existing empirical literature and original contrastive analysis. This approach is particularly suited to examining how cognitive processing mechanisms interact with translational practices in the teaching of Chinese to Arabic speakers.

Following Creswell (2014)methodological tactics, the study triangulates three sources of data: a linguistic corpus of Chinese characters and phrases commonly taught to Arabic-speaking learners, pedagogical materials (textbooks, media translations, classroom practices), alongside neurolinguistic findings from ERP and fMRI studies on logo-graphic language acquisition. It is worth noting that the aim behind the study is not to come up with experimental generalization, but to generate theoretical integration and cognitive modeling, focusing on how Arabization and Localization shape mental representation.

5. 2 Literary Translation Case Study: Lu Xun 鲁迅

Lu Xun (1881–1936) is among the most translated Chinese authors into Arabic. His short story *Diary of a Madman* (狂人日记) has been translated into Arabic and circulated widely in academic contexts.

Original Chinese Text (Excerpt)

吃人的是我哥哥！
我自己被人吃了，可仍然是吃人的人的兄弟！

Pinyin:
Chī rén de shì wǒ gēge!
Wǒ zìjǐ bèi rén chī le, kě réngrán shì chī rén de rén de xiōngdì!

Published Arabic Translation

!الذي يأكل البشر هو أخي»
« لقد أكلتُ أنا نفسي، ومع ذلك بقيتُ أخًا لمن يأكل البشر »

5.3 Arabization vs. Localization Analysis

At first glance, the Arabic translation appears fluent and idiomatic. However, a closer cognitive-linguistic analysis reveals a strong Arabization strategy.

5.4 Arabization Indicators: Syntactic Restructuring:

The Chinese sentence relies on repetition and parataxis which is a stylistic hallmark of Lu Xun’s 1881 psychological narrative. Accordingly, the Arabic version reorganizes the structure to conform to Arabic rhetorical norms, reducing repetiti

5.5 Metaphorical Neutralization

In Chinese, 吃人 (“eating people”) operates simultaneously at literal, metaphorical, and socio-political levels, symbolizing Confucian moral cannibalism (Lu Xun, 1918). Alternatively, the Arabic translation conveys the literal meaning but does not explicate the cultural metaphor, leaving interpretation implicit.

Chinese Character Literal Meaning Cognitive Load

Chinese Character Literal Meaning Cognitive Load

吃	to eat	embodied action
人	Human	social identity

Table 1. Loss of Character-Level Semantics

As empirically attested, Chinese readers process these meanings through direct visual–semantic mapping, while Arabic readers access meaning only through lexical substitution, bypassing character-based conceptual buildup. According to Nida (1964), this reflects dynamic equivalence, yet, from a neurolinguistic perspective, it unfavorably maintains L1-mediated comprehension, reinforcing Arabization.

5.6 Media Discourse Case Study: Political Language

Chinese Source (新华社-Xinhua News)

中国坚持和平发展道路，推动构建人类命运共同体。

Pinyin:

Zhōngguó jiānchí héping fāzhǎn dàolù, tuīdòng gòujiàn rénlèi mìngyùn gòngtóngtǐ.

Common Arabic Translation: « تلتزم الصين بطريق التنمية السلمية، وتعمل على بناء مجتمع
المصير المشترك للبشرية ».

5.7 Semantic Decomposition and Cognitive Effects

This type of translation (section 5.6), though accurate, seems to hide conceptual density encoded at the character level.

Character Literal Meaning Arabic Rendering

坚持	hold firmly	تلتزم
道路	road/path	طريق
构建	construct	بناء
命运	fate	مصير
共同体	shared body	مجتمع

Table 5. Semantic Decomposition

The compound 人类命运共同体 which literally means “*a shared body of human destiny*”, invoking collectivist ontology deeply rooted in Chinese political philosophy (Zhao, 2013). Arabic translation renders this as *مجتمع المصير المشترك*, which is semantically acceptable but conceptually flattened. From a Localization perspective, a pedagogically enriched translation might include: «جماعة بشرية ذات مصير واحد مشترك». The latter may signal a preserved embodied collectivist metaphor (体 *body*), allowing Arabic readers for a deeper conceptual access.

5.8 Cognitive Implications of Translational Choices

According to Kroll et al. (2010), meaning is accessed through direct conceptual mapping resulting in stronger memory traces than meaning accessed via L1 mediation. In the translations above, it seems that the process of Arabization tends to prioritize fluency and readability while Localization prioritizes conceptual transparency and cognitive restructuring. Neurolinguistically speaking, Arabization sustains Arabic semantic networks, whereas Localization encourages the formation of Chinese-conceptual schemas, even in translation. ERP studies on bilingual semantic access (Thierry & Wu, 2007) demonstrate that even when reading in L2, bilinguals unconsciously activate L1 semantics. Localization-oriented translation

seems to sharply minimize this effect by foregrounding source-language conceptual structure.

6. Pedagogical Value of Localized Translation

Incorporating parallel Chinese-Arabic texts in the classroom where characters are visually presented alongside semantic decomposition rather than mere glossing has been shown to improve radical awareness, enhance inferential reading skills, and reduce reliance on Arabic phonological rehearsal. For example:学习学(to study) (to practice repeatedly)(translation mine). This approach seems to align typically with brain-based learning principles and fosters neural localization rather than transliteration dependency.

7. Conclusion

This study has demonstrated that the transfer of the Chinese language into the Arab world is readily to be conceived as a process of cognitive and neural adaptation rather than mere linguistic substitution. By applying the framework of Arabization (Taʿrīb) and Localization (Tawṭīn), the analysis shows that these approaches correspond to fundamentally different modes of language processing with direct implications for acquisition, translation, and pedagogy (Al-Khūlī, 1982; Abutalebi & Green, 2016).

The contrastive linguistic evidence highlights the substantial topological distance between Arabic and Chinese. Arabic’s alphabetic and phonology-driven system contrasts sharply with Chinese’s logographic script and lexical tone structure, which rely on holistic visual recognition and pitch-based phonemic distinctions (Perfetti, Liu, & Tan, 2005; Tan et al., 2005). While Arabization strategies such as transliteration and Arabic-mediated explanation tend to reduce initial learning

barriers, they also seem to prolong dependence on L1 processing routines that are poorly aligned with Chinese orthographic and phonological demands, thereby limiting long-term proficiency (Sweller, 2011). Neurolinguistic findings provide strong empirical support for this claim. ERP research on neural print tuning indicates that adult learners initially display bilateral and coarse N170 responses, reflecting general visual processing. With increased proficiency and direct engagement with Chinese characters, learners develop fine-grained, left-lateralized N170 tuning comparable to native readers, signaling the formation of specialized neural circuits for Chinese script processing (Bentin et al., 1999; Maurer et al., 2006; Song et al., 2024). These neural changes are more predictably to correlate with reading fluency, vocabulary development, and morphological awareness, confirming that Localization is both a cognitive and neurological outcome (Li, Legault, & Litcofsky, 2014).

The analysis of Chinese-Arabic translation has further revealed that dominant Arabization-oriented practices prioritize fluency in Arabic at the expense of conceptual density encoded in Chinese characters and metaphors (Nida, 1964; Pym, 2014). Localization-oriented translation, by contrast, preserves source-language conceptual structures and facilitates deeper cognitive engagement, consistent with findings on bilingual semantic processing (Thierry & Wu, 2007; Kroll et al., 2010).

In sum, Arabization and Localization are best understood as stages along a continuum. While Arabization may function as initial scaffolding, sustainable Chinese language competence among Arabic speakers may depend on a systematic transition towards Localization, reflecting on the brain’s capacity for neuroplastic reorganization and autonomous L2 processing (Dehaene, 2009; Zhang & Lu, 2019).

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