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Cross-Cultural Language Awareness: Contrasting Scenarios of Literacy Learning

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Abstract

In the research on literacy learning the concept of language awareness has come forward as a unifying framework for understanding the underlying knowledge that supports ability in reading and writing. Consensus is gathering around the idea that language awareness is an essential foundation. If subsequent work in this area confirms it, this factor may turn out to be the key cognitive-domain explanation for successful literacy learning in school (and for academic purposes in general). In this review we examine two cross-cultural comparisons regarding this claim. The comparisons point to the need to examine cases that juxtapose contrasting conditions. Relevant contrasts place side by side examples that appear to be typical and examples that appear to be exceptional. Taking what appear on the surface as sharply diverging cases, how is access to requisite underlying competencies similar, and how different, from one instance to the other?

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1 Comparing Divergent Language-Culture Interface Conditions

The contrastive analysis of language use, as in literacy, with a focus on linguistic and general cognitive factors, promises to continue providing valuable insight on learning processes. A complementary approach seeks to study cases where language correlates with contrasting cross-cultural factors related to writing. In the testing of a claim about learning, the more "distant" the contrast the more decisive should be the adjudication of a claim, for example one related to the language awareness factor. Divergent factors of language and cognition interact with the respective cultural differences with which they are related in actual use of language in different domains. For example, aspects of discourse ability interact with the sociolinguistic context (a cultural factor); aspects of phonological competence interact with the design features of the writing system (a cultural innovation).

2 Two Dimensions of Awareness

2.1 *Metacognition in the Domain of Language*

The scientific study of literacy has made great progress in identifying the critical set of competencies and skills that underlie reading and writing. Language awareness, or metalinguistic awareness (MA), appears to be an overarching construct that is at the center of this set, a network of knowledge components and abilities. In fact, today the strongly emerging consensus, after many years of work, is gathering around the conclusion that the early dismissal of the importance of systematic awareness of form and pattern was incorrect. Future research might be able to point to two dimensions, or axes, that help describe the properties of MA: (1) corresponding to each subsystem of language (phonology, morphology, syntax) an aspect of MA emerges in development (phonological awareness, morphological awareness and syntactic awareness). Beyond the sentence (syntax), within the discourse/text knowledge domain, awareness can be thought of as a kind of metacognition, awareness of coherence and other features of discourse/text organization. The linguistic knowledge related to text-level awareness includes, for example, aspects of coreference

and the use of discourse markers (Collins, 2011). These meta-level proficiencies overlap with syntactic awareness (Deacon & Kieffer, 2018) within the sentence applied to cognitively demanding comprehension of academic-type texts. Importantly, none of these aspects of MA, even as we can think of them as belonging to an "overarching construct," can be completely subsumed by any of the others. (2) The second axis is a proposed distinction between implicit knowledge and awareness – between each linguistic subsystem and its corresponding awareness domain. Both (1) and (2) follow from the development of the concept of MA in Gombert (1990), developed further over the years in a number of applications to problems of learning, for example in Apel & Apel (2011) among many others.

We hesitate to say that MA is unique to literacy because non-literate persons who possess advanced language ability (e.g. historically prior to the introduction or invention of writing in their culture) demonstrate analogous, or parallel, MA proficiencies. Examples abound in the modern day from the research on the oral tradition. Here, we are considering, most prominently, aspects of language awareness/MA at the discourse-processing level as it interfaces with awareness at the sentence level (syntax). At the same time, it is fair to say that literacy augments and broadens these language proficiencies.

Regarding the second comparison mentioned in the Abstract, it has been the international collaboration between researchers working on the contrast between alphabetic and morpho-syllabic systems that needs to be singled out for its advances in this subfield over the last fifty years. Modern Standard Written Chinese (the Chinese characters), and its precursors historically, is the most representative example of morpho-syllabic writing. Possibly no other cross-cultural scientific endeavor in the area of language-related research has been as productive. The reference list alone of a selection of the representative work from just the most recent years would surpass by far the word limit for submissions to this journal. In studying the range of writing systems we often contrast the features of orthographies along the dimension of so-called depth: the relatively "shallow" scripts of transparent Finnish and Italian versus the less consistent, of greater "depth," as that of English writing. We could say that the case of morpho-syllabic writing is in a category all its own, beyond deep.

2.2 *A Proposed Research Framework*

Defined as awareness of language pattern and attention to form, MA is not required or implicated in a necessary way in the development of basic linguistic competence and ability in context-embedded face-to-face communication. This idea is related to the second axis mentioned above. For literacy, it apparently is not required as a necessary prior attainment for early reading ability

either (Castles & Coltheart, 2004). It might come to be implicated in early language acquisition and early literacy under favorable conditions. But as proficiency advances along with the demands of academic text comprehension, MA appears to present itself as an essential component. If this proposal turns out to be incorrect, we have been on the wrong track, together with the greater part of the recent research on literacy. According to the two axes schema, MA is knowledge that is *different in kind* from implicit linguistic knowledge (basic competence). Alternatively, MA would be knowledge or ability that is simply more difficult to master than elementary "implicit" competence, requiring more work, more of the *same kind* of learning.

In this discussion, our focus on linguistic knowledge will consider the cross-language dimension. In turn, the orthographies that are built upon linguistic knowledge correspond to a cross-cultural factor that is aligned with the cross-language factor. For humanity (and for humans developmentally) the language came (and still comes) first. If in a given case of comparison the language-aligned cultural contrast is "distant," this divergence might present a good test of a hypothesis about the importance of language awareness.

3 Comparing Literacy in the School Language and in the Home Language

3.1 *Culture and Writing*

In our study of reading and writing in a local community language, we began by considering the situation of language contact that presents a significant contrast for most child bilinguals in the world today. In the first research site, Spanish was the medium of instruction. While Nahuatl was the community language, spoken by virtually all students, it was Spanish that was the almost exclusive medium of teaching, in particular the teaching of literacy. Interesting, however, was a circumstance shared in common: the two orthographies are both "shallow" to the same degree, and also make use of the same inventory of phoneme-letter correspondences. Nahuatl in this case, language of the former Aztec empire, adopted the European writing system in the 16th Century, an interesting historical note that deserves a separate discussion.

The at-the-limit juxtaposition in this study was that between performance in Spanish and equivalent assessments in Nahuatl, not the daily medium of literacy instruction. Final results showed that in all parallel assessments of reading and writing students were successful in applying skills of decoding, comprehension and coherent written expression to reading and writing in the local community language. The application of these skills was possible,

we proposed, because they form part of a set, or network, of shared underlying abilities, shared between and stored independently from linguistic competence in the two languages (Chireac et al., 2017; 2019). This access[1] to shared underlying knowledge and skills (hypothetically, including MA, because core components of MA are not specific to either linguistic system of the bilingual) is often termed "transfer" in the research literature.

All cross-language comparisons showed statistically significant advances, in parallel, across the grade levels. Performance in reading and writing in the community language improves across the grades, along with Spanish. The finding was clearly consistent with the model of common underlying proficiency, revealed even in the case of near maximum sociolinguistic imbalance (Chireac & Francis, 2016). The alternative hypothesis was that performance on tasks in the "non-instructional" language would stagnate across grade level (from 2nd grade to 6th grade). On this question, the comparison of contrasting assessments did not support the alternative hypothesis that access to MA-related skills would be unavailable because of the social/cultural imbalance. Hamel (2010) had garnered evidence for similar kinds of parallel development in support of the common underlying proficiency concept in community language-bilingual communities of Hidalgo and Michoacán states, Hñähñú and P'urhepecha languages. The Mexican studies were thus in line with results from other bilingual comparisons on this aspect of cross-language access to higher-order proficiencies, tied to metalinguistic awareness and metacognition. Three recent studies involving language-contact of the kind of imbalance noted in our project (imbalance less pronounced to different degrees, but still relevant) are: Desrochers et al. (2018), Wawire & Kim (2018) and Wei & Zhou (2013). Serving as a contrasting example, Lin et al. (2018) demonstrate the productivity of cross-language access to MA in a situation of balanced language contact.

One proposal that we hold out for further study is that the near maximum social imbalance was significantly compensated for by the fortuitous

1 Independently, from their own work on bilingual and second language literacy, Cheung & Lin (2005) and Walter (2007) also began to use the more descriptively adequate term "access" – access to shared (not "language-bound") competencies and abilities, shared between L1 and L2, in a "central system." L1 and L2 competence share the same conceptual representations and higher-order capabilities tied to metalinguistic awareness. To this point, our colleagues in Second Language Acquisition (SLA) also seem to have something else in mind when referring to the process of "transfer" between L1 and L2 grammars – more along the lines of "cross-linguistic influence." We thus propose to accept this narrower, and more precise, conception of "transfer" from SLA. In the end, the terminology is secondary. Eventually, we can all agree on what the terms refer to.

parallel in regular and transparent script plus the high level of one-to-one phoneme-grapheme correspondence between the two writing systems. The tentative hypothesis is that this kind of orthographic coincidence, leveraged by the students in a kind of bilingual "recoding," favors access to MA-related skills.

3.2 *Bilingualism and Metalinguistic Awareness*

The Nahuatl literacy study indirectly alluded to the discussion on the relationship between bilingualism and MA. Are advances in MA causally linked to bilingualism, per se (i.e. knowledge of two languages by itself), or to the use of two languages in cognitively demanding tasks: reading and writing in school and other challenging language use, such as translating or storytelling (e.g. not in the source language of a traditional narrative)? Might L2 learning, in particular, be a motor for metalinguistic awareness? Then, cognitively demanding monolingual text and discourse processing may also provide for similar MA enhancements. Monolingual children immersed in challenging cognitive environments of their culture's oral tradition or literary tradition would acquire advanced MA capabilities as well. On this idea, knowing two languages, might provide children with a natural opportunity, ready at hand, so to speak, to develop the secondary attainment of MA. Bilingualism, then, would be an opportunity among others (Chireac et al., 2019). Eviatar et al. (2018), Le Pichon et al. (2010) and Reder et al. (2013) are three relevant studies that weigh in on this question, specifically attending to young bilinguals who are *second language learners*.

The mixed results on this research problem, reviewed by Chen et al. (2013), are entirely predictable. Just on the methodological plane, studies find "advantages" and "disadvantages" because "bilingual" can encompass a wide range of dual-language ability, from one population to another, and from one individual to another. For example, the assessment of phonological awareness, measured in the second language, might be testing this awareness in children who are beginner, intermediate, or advanced L2 learners. In the case of beginners, it is unlikely to find any advantage over monolinguals (tested in the language they speak natively, "advanced" by definition). Even subtle differences in text processing between bilinguals and monolinguals, in adulthood, have been found, as in the study, comparing Mandarin and Hakka, by Wu & Ma (2017). The Chen et al. (2013) study compared Mandarin and Minnanyu. Lastly, it is important to point out that the question of the hypothesized advantages of bilinguals over monolinguals on measures of MA and other higher-order proficiencies is separate from (even though it is related to) the discussion about the access by bilinguals to shared MA-linked abilities.

In one of the tests of the Mexican study we assessed students' ability to recover from reading miscues with the support of accurate decoding of subsequent text, also known as "repair." In a sample of oral reading for example, the repair is noted when the reader stops to return to the miscue, or error, to attempt a self-correction, or attempts a self-correction immediately (although we can't be sure how much of the subsequent text was processed visually). On a separate assessment, we scored self-corrections of first draft written expression for effectiveness and type (word-level, sentence-level and textual coherence). Efficient and accurate self-corrections naturally correlated with overall literacy, including measures of discourse-level coherence in students written expression, but also with a separate estimate of MA (not dependent on literacy) related to students' knowledge of two languages.

In a subsequent study in Ecuador we evaluated similar dimensions of literacy skill. In this case children were not bilingual, although they study the heritage language of their community, Quichua, in school. In an attempt to improve on the open-ended assessment of detection and correction of errors in the Mexican study we designed a series of closed-ended tasks. On a choice-question format cloze test, the most difficult items tended to be (significant statistically) the ones that required more post-target word decoding, processing up to and including the end of the sentence if necessary. The easier items, overall, were the ones for which both distractors could be discarded with prior context alone; to select the correct response readers did not have to take context after the blank into account. This result was consistent with the earlier finding that successful self-correction (on the open-ended task) was correlated with overall reading ability and MA (Francis, 2012). In the previous study (Mexico), students with higher MA and overall literacy scores were more likely to take subsequent context into account when correcting errors. The results are clearly tentative, but we believe they serve to propose this line of research for further study.

Aside from the overall exploratory and descriptive design of the studies, other limitations of this series that need to be overcome were that the sample size was relatively small (45 and 49, respectively), and that ceiling effects within the more advanced 6th grade cohorts affected comparisons. The results from our project in these communities we hope serve as an incentive for further work in this neglected-by-field-research population (L2 learning, rural, local autochthonous language). Summarizing, the contrasting sociolinguistic-cultural condition did not cancel the capacity by learners to access MA-related discourse-level competences, learned via Spanish (the school language), when performing experimental literacy tasks in the autochthonous language. The relevant language awareness competences remained

available for implementation cross-linguistically despite the sharp contrast in sociolinguistic context that might have blocked this availability.

If writing, today, in Nahuatl was socially just as common as writing in Spanish (at one time, many years ago, it was), the comparison in this discussion would not be as interesting for our question of discourse-level MA. In the following section we will consider an aspect of language awareness in the learning of a writing system that encodes morphemes and syllables, but not phonemes. If the East Asian cultures had not invented and developed morpho-syllabic writing systems, and had perfected an alphabetical system instead, similarly as in the first case, the study of Chinese writing would not be as interesting on the question of phonological awareness. We can now pose a question: In the case of the bilingual autochthonous language speaking children from Latin America, it appears that access to the learning strategies of MA – at the discourse level – even under special circumstances, remained available. Might access to the learning strategies of MA – at the phonological level – under different special circumstances also be available to children in the case of learning to read the Chinese characters?

4 Literacy in Chinese

4.1 *The Cross-Language and Cross-Cultural Study of Writing*

Let us rephrase the question that concluded the previous section. Assuming that metalinguistic awareness-related skills are important in literacy generally, our proposal from the exploratory findings in rural communities was that even for literacy in languages not supported by the school teaching program, access to MA proficiencies are not blocked or by-passed. This tentative conclusion led us to consider a different kind of learning scenario: is access to one aspect of MA in particular, phonological awareness, also not by-passed in literacy learning in a morpho-syllabic system? The cross-cultural comparison here is between the alphabetic and morpho-syllabic writing systems. Specifically, is phonological awareness an important component of literacy learning in Chinese? In this case, not able to do the experiments ourselves we carefully studied the pertinent research reports of our colleagues.

The cross-language/cross-cultural study of alphabetic literacy learning and morpho-syllabic literacy learning probably represents the instance of greatest divergence when considering the orthography factor. It may be for this reason that this subfield has surpassed all other comparisons as the most productive cross-cultural research exchange in the study of literacy. For researchers

working on literacy based on the morpho-syllabic system, alphabetic systems are the outmost contrast, and vice versa for researchers working on literacy based on an alphabetic system.

Seeking examples from this contrast serves to test theories of how children, across different literacy cultures, master the language-grapheme correspondences. The question that arises here is: to what extent can we be confident about generalizations regarding the relevant cognitive processes and the nature of the underlying knowledge? If an aspect of learning is proposed as a cross-cultural constant, on one level or another it must apply across the board. For example, from the point of view of research that has been based on alphabetic reading it is simply not reasonable to set aside the system of Chinese characters and related systems derived from them. Today, with literacy attainment in the two countries of its origin culture at world-class levels, widespread use in all overseas Chinese-language speaking communities, and extensively integrated into Japanese writing (as the *kanji* subsystem), it can no longer be taken as singular, in the sense of being anomalous. This argument could have been made, albeit incorrectly, when literacy was mainly restricted to the educated elite (Taylor & Taylor, 2014), but no longer. Proposed universals have to apply in some non-trivial way, in both directions when neither of the cases is an outlier. Getting a clearer grasp of the construct of language awareness might help us formulate the right questions because we can start with the assumption that language awareness applies universally to literacy, in one way or another.

The idea, widespread for many years, that the Chinese characters formed a system of logographs and pictographs[2] contributed to the view that unlike all other modern writing systems, tied to the linguistic subsystems (in particular phonology), characters allowed for a direct and exclusive activation of meaning. The link was conceived as so direct that phonology could in fact be by-passed in natural text processing during silent reading; that, according to this theory, activation of the sound system of Chinese would not be automatic in sustained text processing. This proposal is related to the theory that the system of characters is "language-neutral" in a fundamental way.

2 The theory of a direct and exclusive connection to the more "natural," "semi-pictorial" and "vivid" meaning-based system of signs, by-passing phonology, was famously popularized in early studies of Chinese poetry (Fenollosa & Pound, 2008[1918]), to be resurrected years later by post-modern theorists. As Foucault suggested: "[The] presence of repeated speech in writing … gives to what we call a work of language an ontological status unknown in those cultures where the act of writing designates the thing itself, in its proper and visible body" (p. 91).

A number of lines of research come together around three related questions related to the question of character exceptionality: (1) What are the special design features of the morpho-syllabic writing system itself? (2) Which linguistic subsystems, including the language-conceptual structure interface, are activated during processing of text? Relevant experiments also include how individual characters are perceived and processed in isolation under controlled laboratory conditions; (3) the learning problem – how do children, in particular, learn to read characters? Here is where the question of MA, awareness now corresponding to the linguistic subsystem of phonology, comes into the picture.

4.2 *Special Design Features*

To answer (1), we start with the fact that the vast majority of characters (85–90% depending on how we count, i.e. how the "infrequent" characters are counted) are compounds, one of their two components consisting of a phonetic that suggests the pronunciation of the morpheme, almost always a syllable. No constituent or stoke pattern of the phonetic component corresponds to a phoneme; the character maps onto a morpheme-syllable. Thus, in the design of the writing system there is evidence for the participation of phonology. While important to take note of, it is also important to clarify that it is not accurate to describe an orthography with tens of thousands of characters as a syllabary. In fact, the mapping between semantic-phonetic compounds and the pronunciation suggested by the phonetic is highly opaque (Lee et al., 2006).[3] Then, the presence of the semantic radical of the character (unique among all modern writing systems) potentially weakens the argument for the role of phonology. The semantic radicals form part or constitute the character itself of: the semantic-phonetic compounds, associative compounds, or logical aggregates (typically two semantic components), and single-component unitary characters (see Figure 1). The last two types include some true iconic logographs that have retained vestiges of their ancient pictographic origin. These unique features appeared to support the direct link to meaning view.

3 Studies that categorize compound characters learned in elementary school according to regularity (the contribution of the phonetic to the pronunciation of the character) estimate that 23% are fully regular (Chen, et al. 2003). Extensive homophony and inconsistency between orthographic form and pronunciation makes the computations of decoding more complex than for alphabetic scripts (Zhou & Marslen-Wilson, 1999).

請 – semantic-phonetic compound
"qǐng" – The left-hand side component 言 suggests a category of meaning [speech, word] + the phonetic 青 that gives the pronunciation, "qǐng": 請 [please, to ask, to invite]

働 – logical aggregate (from kanji)
"hatara" – Japanese *kun* reading, "dō" – Japanese *on* reading [work]: 人 from the Chinese character "ren" [person] + 動 from the Chinese character "dóng" [to move, to make use of]

本 – single component unitary
"běn" [root]

FIGURE 1 Types of characters: three examples

4.3 *Subsystems of Language in the Processing of Text*

The descriptive work on the componential properties of characters leads to question 2 of Section 4. Could it be possible that their exceptional design features forge a dedicated link in reading: direct, consistently, from orthography (O) to semantics (S)? While activation of the meaning of the morpheme prior to the pronunciation (P) of the syllable has been demonstrated in various studies applying different experimental paradigms, the debate and discussion at some point set aside the model of an exclusive O→S pathway that invariably overrides an O→P→S pathway. The metaphoric "pathway" actually should be in quotes, because it suggests single routes, instead of interfaces among the components of the orthography and the linguistic subsystems. In addition, it unnecessarily suggests a model where phonology mediates the activation of semantics.[4]

In the course of history, each coupling of language and writing system has culturally evolved to fix the parameter settings of how the lexical components

4 The non-scientific theories, as in note 2, aside, recent models that at first glance appear to favor a direct link from written form to meaning in reality propose an explanation for the data that differs from the phonology activation model more along the lines of degree and emphasis. Differences of interpretation seem to be about *how* phonological information interacts with orthographic form and the other linguistic subsystems (Zhou & Marslen-Wilson, 1999). What emphasis should be placed on the degree of participation of phonology versus the degree of participation of visual processing in constraining semantic activation when we compare Chinese characters and alphabetic systems? If phonology is an integral constituent of word recognition then reading recovers, engages, the same subsystems of natural language comprehension. The details of timing and interaction with the visual processing of graphemes will show interesting differences from one language and orthography to another.

of phonology, morphology and semantics are linked to the graphemes. The settings in each case, of how "finely" or how "coarsely" they are linked, affect the tracks and timings of activation, also varying from one type of reading activity to another (Cheng & Caldwell-Harris, 2010; Lee et al.; 2006, Perfetti et al. 2013; Yin & McBride, 2017). For example, the Cheng & Caldwell-Harris (2010) study showed how readers of English and Chinese evidence sharply contrasting patterns of oral reading miscue (in particular, the semantic substitution error). With this variation in mind, a consensus has converged on one version or another of a universal activation of phonology; i.e., the sound system is not overridden or evaded during sustained silent reading in morpho-syllabic writing.

If the sound system of the language cannot be by-passed in any writing system, the outlines of a model begin to emerge. Taking up the example of morpho-syllabic writing, Packard (2000) presented one model, as follows. In the natural lexicon each entry is composed of sub-structures. The lexical entry is a "relation" among: phonology, syntactic form class and subcategory, morphology and semantics, interfaced with an orthographic representation for literate speakers. The Chinese writing system, no different than any other in this regard, is completely dependent on the natural speech lexicon (p. 304). The linguistic subsystems that are activated in reading are the same ones that all speakers of the language possess, including non-literates. It would not be plausible that literacy learning recreates a parallel and duplicate competence for processing written language. What literate speakers of Chinese may be able to count on is a more advanced explicit awareness of morphemes and words that might help them with certain analytic tasks and in reading itself. But, the development of this metalinguistic knowledge remains separate from, and leaves intact, the specialized components of native-speaker linguistic competence, including all interface modules (p. 305). Following this logic, the grammatical subsystems of the lexical entry are tightly interlinked, input of an orthographic form triggering the retrieval of its core linguistic sub-structures, rapidly and automatically in skilled reading. In speech perception, the process is triggered by sound, which can only activate the sub-structures of the lexical entry by way of phonology. In silent reading, lexical entries could be activated by retrieving either the sound or meaning sub-structure "first"; experimental evidence has shown that either can occur. In Chinese an "earlier" retrieval of meaning might even be more likely under certain word identification task conditions (p. 307). But making the connection to meaning in the processing of text cannot occur independently of the linguistic system in which phonology and semantics are closely joined, genetically interconnected. In this way, "phonetic recoding" is a "virtual reflex" (pp. 308–309). In typical reading, if any cognitive domain is

susceptible to becoming disengaged it would be a higher-order level of conceptual structure related to discourse-level comprehension, a phenomenon that metacognitively aware readers are all familiar with. We associated these observations with the hypothesis of a componential, or modular, organization of language abilities (Francis, 2013).

4.4 *The Learning Problem*

So far, the evidence for the processing of the sound patterns of language during reading in (4.3) does not entail that phonological awareness (PA) is accessed obligatorily during learning (Question 3) – the converse would, of course. It is possible that learning and attaining high-level skill in reading by children does not engage PA, at either the phoneme or syllable level, as it does in learning of alphabetic writing systems. In the case of alphabetic literacy the evidence is now strong that it does (Diamanti, et al., 2017; Ehri, 2005; Kjeldsen et al., 2014; Saiegh-Haddad & Taha, 2017; Schaars et al., 2017). Take note that we have put aside for now any more discussion of awareness at the syntactic level or metacognition at the discourse/text level. Logically, there would be no potential contrast between the two writing systems in these domains.

Then within the domain of phonology, it's important to remember from (4.2) what the defining contrast with alphabetic systems is: the morphemes that characters correspond to are single syllables of the language. Also, it is important to keep in mind that just as in all languages: morpheme ≠ word. A Chinese morpheme can be a free-standing word, or form part of a word containing two or more morpheme-syllables. Thus, the analogy to be confirmed or disconfirmed by research for *learning* (Question 3) would be: syllabic awareness is to morpho-syllabic literacy as phonemic awareness is to alphabetic literacy. After reviewing the findings from recent studies on this question, we will ask, speculatively, why some studies have found evidence for the participation of awareness at the phoneme level in Chinese-language elementary school reading. One hypothesis in particular represents a key framework for evaluating the research on literacy learning in children: that native speakers of Mandarin learning Modern Standard Written Chinese (traditional in Taiwan, simplified in China) are sensitive to and systematically make use of (full and partial) regularities, within the limits of an overall inconsistency, in learning the character system, what the authors call the "phonetic principle" (Chen et al., 2003). Whether the evidence brought to bear in favor shows the "phonetic principle" to be correct or shows it to be erroneous will be an important adjudication for the present discussion going forward. Alternatively, the purported learning strategy involving phonological regularities may simply be overstated.

We start with the results of a major seven-year longitudinal study of 294 children from Beijing, mean age just under 4 years 5 months at the time of first assessment (Pan et al., 2016). Among other measures at the beginning of the study, pre-literate syllable awareness was tested coming to directly predict post-literate morphological awareness, character recognition and character dictation at age 11 (not predicting estimates of reading fluency or comprehension). The authors emphasize that for the basic unit of the writing system, syllable and morpheme form a strong link coinciding upon the character. The morpheme, matching a unit of speech in a syllable, is what it represents on the page. To resolve the problem of homophony, for example, beginning readers should benefit from these two aspects of awareness (syllabic and morphemic, the former possibly facilitating the latter). Both of these aspects of MA converge on orthographic awareness. Skilled reading attained in large part through "self-teaching" (extensive daily exposure to comprehensible texts) attends to this relation of high reliability.

When beginning readers encounter new multi-character words embedded in the string of characters of a sentence (word boundaries are not marked by spaces) they must parse them correctly and efficiently. Literacy learners must mentally group characters that come together in words consisting of two or three morphemes within the string that also includes single morpheme words. Some of the words will be new in their written form; others will not yet be well formed lexical items, and some maybe new in every way. Keeping morpheme-syllables on the "workbench" is probably best served by phonological short-term memory, a tool inherited, so to speak, from the six-year-old's natural language processing capability. More research on this problem is needed comparing the use of visual and auditory information in pre-literate children and child beginning readers.

Previous studies have pointed to the same linkage. Lei et al. (2011) measured possible linguistic and cognitive predictors at ages 3;4 to 6;4 and literacy skills at 8;4 – syllable awareness, morphological construction and rapid naming showing to be significant. Shu et al. (2008) compared phonological awareness and character recognition in young children, kindergarten age, prior to formal literacy. In addition to rapid naming, the strongest correlates for reading were tone detection and syllable detection.

In a two-year longitudinal study involving Hong Kong kindergarteners all native speakers of Cantonese, Tong et al. (2011) sampled both receptive and productive literacy skills. Interestingly, in contrast to mainland China and Taiwan, children in Hong Kong learn characters without the aid of phonetic notation. In addition to reading skill, at the one year and two-year mark, the

study measured writing (a dictation test at two-years). Syllable awareness assessed prior to instruction at 4 years 3 months predicted reading and writing at year one (not at year two). Homophone awareness at age 4, a morphological awareness (oral) task, predicted performance on both literacy skills, recognition and production, more consistently across time. The authors suggest that as strategies in reading and writing advance syllable awareness diminishes with importance, in line with an interpretation by Shu et al. (2008) that different kinds of phonological awareness show different developmental trajectories. Wei et al. (2014) found that PA, measured at both phoneme and syllable levels, along with morphological awareness predicted character recognition across K-3rd grades.

Replication and careful evaluation of varying results, including studies that have not shown a correlation with syllable awareness (Liu et al., 2017) will resolve the outstanding discrepancies in findings. The Liu et al. study sought to go beyond confirming the importance of morphological awareness in reading, to delve into the underlying mechanisms that explain the interactions with syllable and orthographic awareness. The authors focused on awareness of compounding and homophone awareness, considering that a syllable can stand for a number of meanings (six share one morpheme on average in the spoken language). Both are aspects of morphological awareness. Syllable awareness was measured by a syllable deletion test, nine nonword items. Participating were 177 second grade native-speakers of Cantonese. Analysis of the results concluded that syllable awareness did not show a significant direct effect on character reading for this group. In proposing an account for the non-confirming result in comparison to earlier studies with younger children, the authors suggested that perhaps the relevant effects may weaken with grade level. A ceiling effect found in the performance of the second-grade subjects in the study might have affected the correlation. In addition, the measure of morphological awareness (which did directly predict character reading) was linked to syllable awareness, the morphologic predicting the syllabic. Here, the study's conclusion cautions that the relationship could have in fact been reciprocal given the cross-sectional design of the study.

In an assessment of PA, among other measures, Wei et al. (2014) tested both awareness at the syllable level and the phoneme level in beginning readers. For beginning learners, each aspect of metalinguistic awareness, each one corresponding to its linguistic subsystem, develops differently, for example coming into play on a different schedule.

Finally, as we mentioned above, it will need to be explained why in some studies PA below the syllable level has been shown to contribute to reading

ability in Chinese, e.g. Hu (2013); Yin & McBride, (2017). If early teaching of *pinyin* and *zhuyin fuhao* represents an important transitional learning objective for learning characters,[5] children with more advanced phonemic awareness might profit to a greater degree from this instruction. The question that is posed of course is whether this factor only comes into play for first graders in China and Taiwan, and not Hong Kong. Alternatively, performance in phoneme awareness tasks might depend on a sensitivity to sound pattern that is down-stream of PA in general, or a correlate of syllable-level awareness in the sense of being by-product.

As a provisional summary of the progress made so far we can propose that, for learning (Question 3), awareness of the sound patterns of the language is not by-passed either, just as phonology is not by-passed or postponed in processing (Question 2). But the contrast between alphabetic and character-based systems clearly results in an important difference in what the mappings are for beginning learners between graphemes and phonological constituents. In discussion of the research, McBride (2016) outlines the two dimensions of this difference: the relative weight of PA in learning, and the units of correspondence. The semantic radical has no analogy in any other modern orthography, and for beginning learners it provides more reliable information than the phonetic radical (only 9% opaque, 58% transparent, 30% semitransparent – compare to the estimate of Chen et al. in Note 3 for the phonetic). Efficiency in compounding, homophone/homonym knowledge and precision in orthographic processing for the thousands of graphically complex characters all converge on the morpheme. A survey of the literature shows that measures of morphological awareness, per se, predict word identification in Chinese more consistently. This correlation appears as more consistent for Chinese literacy learning than it is for alphabetic literacy. Thus, it would be no surprise that for reading ability in Chinese, overall, that the relationship between the different aspects of morphological awareness and reading will be shown to be more consistent than that for PA at the syllable level. This would be also different than the corresponding relationship revealed in alphabetic literacy where PA has been shown to be strongly predictive. The level of phonological awareness that participates obligatorily in Chinese literacy learning is then most likely to be found in the convergence of greatest reliability for learners: the nexus of mappings in the character/morpheme-syllable, conclusion also consistent with the major review of the research by Koh et al. (2018).

5 *Pinyin* and *zhuyin fuhao* are the two phonetic transliterations used, respectively in China and Taiwan, as an aid for learning the characters. In both countries, *pinyin* is the official romanization system. Both are popular smartphone and computer input methods.

5 Conclusion

Work on cross-cultural literacy is important for the same reason why linguistic theory cannot rely on data from a narrow range of related languages. The truly exceptional case might lead us to an obvious solution, that a hypothesized universal property needs to be completely discarded; that it was defective at origin and is leading us further away from a correct solution. If there is reason to believe that the original hypothesis can still be improved, taking into account the full weight of updated evidence, we are presented with two alternatives:

– Assuming that the potential outlier is described adequately, the original formulation may have been too specific, and a more general claim at a more abstract level, what sometimes is called a "weaker hypothesis," can incorporate new findings.
– The disparate results that challenge the hypothesis count as an example of how a universal capability or feature is simply not implemented in every case. The debate about whether some languages exhibit certain grammatical properties, or not, is an example of where this problem applies.

On the sociolinguistic level, the claim of our Latin American project, that access across languages in bilingualism to higher-order meta-level discourse proficiencies is universal, faces a similar assessment. We predict that no instance of bilingualism, even more contrasting than the one we studied (e.g., one where there is no historical, or even modern, practice of literacy of any kind) will falsify the cross-language access hypothesis. A different kind of cross-language and cross-cultural universal has been proposed by researchers of morpho-syllabic literacy. That despite the visible contrast with alphabetical writing, metalinguistic proficiencies linked to the subsystem of phonology have been shown to be important in learning to read characters. This conclusion, if shown in the end to be correct, would confirm the cross-language and cross-cultural proposal in this domain as well. Recall from the research findings summarized in the previous section that the access-to-phonology-*in-learning* hypothesis may in fact turn out to be overstated. Coincidently, the two areas of language ability under investigation in this review belong to the opposite extremes, from highest order to lowest, discourse level to sound pattern level.

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