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Literacy and the language awareness hypothesis

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ABSTRACT

In the study of reading and writing, the concept of language awareness has come forward for increased attention: that awareness of language form and pattern may be a central contributing factor that explains learning beyond basic beginning level attainment. Cross-cultural and cross-language evidence from different disciplines is important to take into account for a better understanding of the cognitive processes that explain the language awareness factor. Examples from the multilingual Western Hemisphere, from the contact between the American and European languages, are especially relevant because of the time scale of available data (over 2000 years for the first full writing system, successfully deciphered) and the closeness of contact and extensive interaction between the languages (over 500 years). Among the most prominent and thoroughly studied are findings from historical and anthropological research on literacy in the Mayan and Nahuatl languages, the latter from the early Spanish colonial era, the former from the pre-classical period of Mayan civilisation. The findings from this work inform studies of literacy learning among all modern day indigenous language bilingual learners in both Latin America and North America. As an illustration, results from a bilingual (Nahuatl-Spanish) literacy learning project in Puebla state, Mexico, are summarised.

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Introduction

With the growing emphasis on cross-language and cross-writing system research, we have begun to converge upon principles of literacy and literacy learning that are foundational, principles that should now apply across all cultures. Even in the case of historical research, in which experiments can no longer be carried out on learning, results from the study of the development of ancient writing systems suggest conclusions that are compatible with current interdisciplinary models.

In a recent essay looking back on previous work, David Olson (2009) summarised what we could call the *language awareness hypothesis* of literacy, supplemented in Olson and Oatley (2014). Gathering together early findings from the 1970s on language awareness (or metalinguistic awareness), in addition to his own studies, an early formulation was presented in the paper 'Literacy as metalinguistic activity' (1991). In parallel to work by other investigations (notably in Gombert, 1992), what distinguished Olson's studies was the integration of results from the widest possible range of disciplines, from preschool child language development to the analysis of classical literary texts and the oral tradition. Careful not to take the idea of consilience too far, the guiding idea of this theory is that the language awareness factor, proposed as central to reading and writing, must on some level or in some way apply to all relevant instances across time, place and culture. In

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Olson's framework, the language awareness hypothesis should also apply, vertically, from phonology up through to the higher-order levels of comprehension and written expression. In fact, the research on the development of metalinguistic awareness during the school years strongly suggests that the hypothesis does apply to all the levels that writing systems engage (Berninger, Abbott, Nagy, & Carlisle, 2010; Diamanti et al., 2017; Packard et al., 2006; Raynolds, Uhry, & Brunne, 2013). Specifically, the proposed application consists in that language awareness is a necessary component of literacy attainment beyond the basic beginning skills and is manifested at all levels from phonological awareness to metacognition at the text/discourse level.

Starting from the first formulation 30 years ago, how should we understand language awareness as different from language competence? This question is at the core of the discussion because it is the former that has been hypothesised to be closely tied to advanced cognitively demanding analytical abilities that develop with schooling and its central learning objective: literacy. We could take the liberty of framing the problem by proposing the following: that language awareness is directly correlated with these abilities whereas the correlation with language competence appears as more indirect (even though writing encodes language). Formulated in another way: linguistic competence is primary, of universal and spontaneous development; literacy and language awareness come together to form a secondary attainment, of deliberate learning. This distinction parallels the same framework from the study of cognitive systems in general, acquired and learned, for understanding what the category of (secondary) 'higher-order' means (Stanovich & Toplak, 2012). Qualitatively different kinds of acquisition and learning are implicated in the kinds of knowledge and skill that are evolutionarily early from those that have emerged recently. During the lifespan of individuals, primary competencies develop with exposure to input of the same kind and show an early plateau (in this sense, they are 'closed-ended'); the secondary are open-ended. The primary systems might depend more on domain-specific competencies, the secondary more on the domain-general, if the theory is correct.

Separately, Olson argued for the closely related *literacy hypothesis*. Aside from outlining necessary conditions for the development of literacy, the (1991) chapter proposed that literacy gives indispensable impetus to the attainment of academic-related learning abilities:

- Writing can fix a text for saving and retrieval, rereading and correcting/revising.
- School as an institution, among others, uses texts and depends on the ability to read and write for mastering advanced learning objectives and for new knowledge creation.
- Metalinguistic ability, metacognition applied to language, focuses attention, thinking and reflection on the forms and meanings of texts, the intentions of authors, and their interpretation in a relevant context. Readers come to contemplate and manipulate texts, patterns of wording and meaning, and even patterns of phonology and morphology within words. Metalinguistic ability develops with attention to and awareness of language—language patterns and language forms. Literacy gives decisive impetus to this ability.

For argument's sake, taking 'text' to refer to both writing and units of oral discourse, the evidence strongly suggests that formal discourse of the oral tradition is also capable of fixing texts for reference and recovery. To one degree or another, authors on all sides of the *literacy hypothesis* debate accept this view. In addition, looking back in history, institutions of learning have presented 'oral texts' of this kind to students as a learning resource similar in many ways to how textbooks, print and electronic, are a resource today. Conceivably, the *calmecac* of the Nahuatl-speaking Aztecs, to take one example, promoted memorisation in both narrative and expository format with effective instructional technique and by the fomenting of high motivation. These methods were probably aided by elaborate graphic representations, the famous codices, that served as context support for the oral tradition content (Boone, 1998; León-Portilla, 1996). In regard to the third point above, as in similar pedagogical settings in other cultures, texts fixed

in memory in this manner were available for reflection and commentary. The great epic poem and creation legend of the Maya, *Popul Vuh*, prior to the discovery of a colonial era alphabetic version, may have been passed down by the oral tradition and/or by texts composed in the pre-Columbian Mayan morphosyllabic script (Christianson, 2007).

Two corollary proposals to the 'general claim' for literacy, related to the language awareness hypothesis, focus on the characteristic properties of writing and literacy learning (Olson, 1991, p. 254—260):

- writing allows for processing via the visual modality, significantly facilitating retrospection and revision, in addition to reference and recovery mentioned above;
- it presents us with a radically alternative medium for communication, and even expression, that in turn promotes new ways to think about how ideas are related to each other, for example, thinking about thoughts and how they are expressed linguistically (graphically, etc.).

Nevertheless, Olson concurs with the generally accepted view, that at some level all of these capabilities have been shown to be in the possession of non-literate speakers (or signers) of any language community, and have shown to be deficient to different degrees among literates. Nevertheless, it is important to point out in regard to the first part of the generally accepted view that few controlled studies have actually been carried out.

Reading and writing – listening and speaking

On this last point, one of the objectives of our research project in Latin America mentioned in the Abstract has been to compile a corpus of oral tradition material for documentation and study. Over the many years of fieldwork, what has become evident is that among adults the most coherent and well-formed narratives include a good number performed by non-literate storytellers—children's stories were evaluated separately (Francis & Navarrete Gómez, 2014). As other fieldworkers have also observed, the ability to execute a complex and self-contained narrative, epic poem or expository discourse emerges from exposure and instruction provided by cultural institutions and practices. This type of autonomous (non-conversational) discourse comprehension and expressive ability, including reflection upon structures of text not completely dependent on previous knowledge context, can develop without the participation of writing, even by learners who never acquire literacy (Finnegan, 2012; Gough & Bock, 2001; Gómez-Pulgarín, 2012). Again, regarding this aspect of the oral–written dimension, almost all researchers, our project included, have generally accepted these observations as intuitively valid based on selective field observation and theoretical argument from related learning scenarios.

The relevant difference between reading/writing and listening/speaking then would lie in the processing capabilities associated uniquely with the written modality and with new learning potential made possible by the ability to study written texts. Simply, the visual modality and the special abilities associated with learned written expression place at the disposition of readers and writers information processing tools that far outstrip listening and speaking in power and efficiency. These capabilities massively boost all of the language capabilities inherited from pre-literate discourse practice. Put another way:

- Linguistic competence develops as a uniform species-specific inheritance.
- Advanced discourse ability is the product of forging an interface between this competence and general cognitive capabilities of organisation, analysis and recombination, abstraction, concept formation and working memory of greater and greater sophistication.
- Writing provides these capabilities with a powerful word-processing technology, the first invention of this kind by humans. At the same time, while reading and writing are indispensable for advanced text comprehension and composition abilities in the modern age, it is important to

recognise its oral discourse antecedents (Olson, 1991, p. 258). While language awareness emerges in the oral tradition and is applied by speakers in cognitively challenging oral discourse practices, writing affords the optimal tool for its further development and multiplies the learning potential of language use, most visibly at the text level beyond the sentence.

Recall from the Introduction that the topic of this discussion is mainly about the centrality of language awareness in the attainment of cognitively demanding literacy skills. In the three papers cited above, Olson in effect argues for two hypotheses: one for the importance of metalinguistic awareness (MA) in literacy-related language proficiency (same as the topic of this discussion), and the separate but related *literacy hypothesis*. The second is the proposal that his project is most widely known for and the one that he has emphasised. My intention is to mainly address the first: the centrality of language awareness in the attainment of cognitively demanding literacy skills. But the aspects of Olson's *literacy hypothesis* that concern learning coincide entirely with the proposal that language awareness, or MA, is central to the mastery of literacy skills. The relationship between MA and literacy, in fact, is reciprocal: incipient MA in early pre-literate child language ability is significantly extended with literacy learning, and further advances in literacy depend on applying MA to literacy learning tasks. The indispensable role of literacy learning in all academic-related abilities, especially rational and scientific approaches to new knowledge creation is today difficult to deny. The compelling case for the validity of this hypothesis, revealed in cultural evolution, across historical time, finds its parallel in human development in the realm of reading and writing, beginning in the formative years of childhood.

Common underlying competencies of discourse-level comprehension

As we took note of in the previous section, recognising how literacy has scaled up our ability to apply cognitive capacities in information processing and concept formation does not negate the continuities between speech and writing. Work on the modeling of discourse comprehension demonstrates how the different kinds of text-level computing of coherence, in the different modalities, share a common cognitive underpinning. Listening and reading share cognitive structures because writing encodes speech; but the underlying foundation is broader than that. In this section, we consider text-level coherence. In this regard, language awareness beyond the sentence is better thought of as metacognition focused on texts – attention to comprehension processes and the monitoring of discourse-level comprehension. In this category, the work by Gernsbacher and associates has shown that some of the computations involved in comprehension access cognitive domains associated with general cognition, even independent of language. In assessment (e.g. in tasks that involve the discerning of story coherence), parallel results are found from the presentation of written, oral and even pictorial items. This finding is supported by neurological studies showing a double dissociation between sentence-grammar processing and text-level comprehension. Trauma patients show impaired syntax processing, as in aphasia, with discourse-level coherence spared, and vice versa for other patients with different lesions (Sirigu et al., 1998), consistent again with the finding of Gernsbacher and Foertsch (1999) that discourse comprehension also depends on non-linguistic domains. Along these lines, Mar (2004) discusses the neurological evidence for properties of story-level discourse processing as distinct from sentence-grammar processing. From a different field, Dautenhahn (2002) presents an evolutionary account for how underlying competencies of narrative discourse ability may have emerged in parallel to, but largely independent of, language.

Non-skilled comprehension is characterised by a more rapid loss of access to recently comprehended information during reading or listening, as opposed to successful comprehension that maintains the activation of coherence-building meaning relationships from one discourse structure to the next. Skilled comprehenders strategically enhance and suppress new information

during cycles of structure building, taking care to suppress new information in a potentially new text structure selectively, so as to link pertinent new information back to conserved previous information. Non-skilled comprehension tends to shift prematurely to new structures (thus losing access to pertinent meanings from the previous cycle) because it is less able to suppress non-relevant information (Gernsbacher & Foertsch, 1999). Readers and listeners who apply metacognitive processes to refection and monitoring will optimise the operations of structure building.

Indigenous language writing

From the beginning of our project on bilingual literacy, summarised in Francis (2012), we found the concepts of the (1991) literacy-metalinguistic chapter useful in guiding the design of assessments. In turn, we called attention to the related idea of Secondary Discourse Ability (SDA) (Gee, 1996) as a way to bring together for observation the common features of written literature and oral tradition. The concept of SDA also highlights the continuities between literacy learning and its antecedents in pre-literacy language use (e.g. story telling), typically during early childhood. Independently, and around the same time, Gough and Bock (2001), began to make reference to this category to describe the same commonalities of text/discourse construction. Recall from the discussion of the Structure Building Model, SDA would not only be largely independent from the mental networks of both Spanish and Nahuatl (in our case), but would be largely non-linguistic as a cognitive domain, if the model is correct. In the same way, aspects of MA should also be non-linguistic, therefore 'shared' between the two language representations of the bilingual within the overall Faculty of Language (FL). The knowledge of each of the two languages in bilingualism can be viewed as autonomous, and interacting, instantiations of the FL, as if in bilingual acquisition or second language learning the neural networks of Spanish and Nahuatl, for example, migrate, forming separate but interdependent networks.

The question posed was: how are MA and SDA relevant to the study of literacy in the specific case of indigenous communities of Mexico where bilingualism is widespread in the school-age population? An important intervening factor in this case is the learning of Spanish as a second language. What continuities can be verified experimentally between community oral tradition practice (not yet appreciably eroded in the community under investigation) and elementary school literacy learning? Is the former an antecedent (in the sense of cognitive-linguistic support or foundation) for the latter?[1] The parallel, historical, questions are about interactions across many generations:

- in the 500-year contact between Nahuatl and Spanish, in particular in the prolific realm of writing, and then
- in regard to the oral tradition antecedents of Nahuatl literature beginning with the period of the pre-conquest Mesoamerican empires. In contrast to the previous question on oral tradition support for literacy learning in school, it is important to point out that more progress has been made on the historical questions (León-Portilla, 1996; Lockhart, 1990).

The results of two assessments in particular showed a close correlation between language awareness (awareness measured by testing the ability to detect cross-language differences and commonalties) and literacy skills. Consistent with the findings of Gernsbacher, language awareness (or MA) was associated with children's ability during reading and writing to use subsequent textual information efficiently for the purpose of repair—productive backtracking to self-correct (Chireac, Francis, & McClure, 2019; Francis, 2012). In both studies, integration of information from one proposition to the next, coupled with accurate and efficient decoding, plausibly contribute to productive text-processing abilities. Rapid detection and evaluation of error or

comprehension breakdown on the part of readers and writers can be taken as a correlate of language awareness (see examples in Table 1).

We will return in the conclusion to an important distinction, when measuring comprehension for example, between two understandings of 'context': (1) activation of background or previous knowledge and (2) ability to track and integrate textual information within the very same text or discourse. The second understanding of context includes textual information within the sentence, in previous sentences, and in subsequent sentences. In the evaluations of reading and written expression, in both Spanish and Nahuatl, MA emerged as a potential contributing factor that favours skilled performance.

The community is located adjacent to modern-day municipalities of the historic urban centres of the Nahuatl-speaking pre-Hispanic period, and subsequent colonial regional capital. Not surprisingly, many townspeople are keenly aware of the Spanish colonial era use of the lingua franca of the former Aztec empire in higher education, legal documentation and literature, religious and secular. Local authors of all ages, among bilinguals belonging to a minority cultural elite, write in both Spanish and Nahuatl on occasion making specific reference to this bilingual literacy tradition, outlined by Heath (1972) as one of a number of accounts widely distributed by Mexican educational publishers. Bilinguals with advanced literacy skills in both languages participate in local translating projects: Nahuatl to Spanish of 16th and seventeenth century documents stored in libraries and church archives.

The historical evidence

Nahuatl is only one of the American languages that played an important role in literacy development during the colonial period. Just as important for researchers and bilingual communities today are the historical precursors (during the epochs of the different pre-colonial civilisations) of this surge in literary activity. Thus, for our field the discovery of a system-wide phonetic component of the Mayan script and its definitive deciphering came as a pivotal conclusion, rectifying theories that had taken us down the wrong track. It set the stage to properly unify the study of pre-Hispanic language and literature with contemporaneous developments in the Old World, in Western Asia and Egypt along with the Chinese invention of writing. The groundbreaking description of Mayan writing revealed interesting parallels with the analysis of the scripts adapted from morphosyllabic Chinese writing by the cultures that inherited the character system (Vietnam, Japan, Korea, the Zhuang people, among others). Handel (2019) is a recent summary of progress toward a complete account and decipherment of the ancient East Asian scripts, based on the principle that writing depends on language, a basic concept that has also served the analysis of modern adaptations of the standard Chinese characters (Bauer, 2018).

The consensus today regarding the writing-language relationship, in particular the encoding of phonology systematically and completely, and the productive manner in which Mayan scribes represented this linguistic component, points to a high degree of metalinguistic awareness applied to the domain of writing and literacy. In this case, the script implements the connection at the point where the phonetic component (syllable unit in Mayan writing) is coupled with graphemes that represent content morphemes. It is not an exaggeration to call attention to the forthcoming unification of these language-writing projects as one of the most important research convergences in linguistics and anthropology internationally.

The research breakthrough overcoming decades of conceptual bias and entrenched schema that had denied the significance of the encoding-of-phonology hypothesis, has been outlined by Michael Coe (1992). All available evidence shows that among the pre-Colombian people the Maya had designed a complete writing system, more advanced for example than the largely pictographic methods of documentation of the Aztecs. The recognition of this achievement does not in any way disparage the elaboration of magnificently crafted Aztec pictorial documents or their various context-embedded communicative functions.[2] The invention and widespread use of these context-dependent graphic systems stands as a parallel achievement to that of the Maya. In fact,

Table 1. Examples of monitoring during self-correction hypothetically indicating the development of metalinguistic awareness: (1)–(5) higher MA, (6) incipient MA.

Writing

(1)

venado
… una rroca a y estaba el ~~conejo~~ el señor tenia mucha anmer
nos
Le dijo adonde esta el vendo que ~~no~~ pormetiste tengo mocha anmer

(RP203) Second grade

(2)

uan
guan oktaquien se tekuani guan quistuan ~~pero~~ quienen se tekuien
tatsitsiuan nanatsin
kin noxasquien nochtin y no ~~papan~~ guan ni ~~mamas~~

(HF604) Sixth grade

Reading

(3)

a[(self-corrected)]

Se puso muy enojada y empezó a batir las alas y quejarse como un guajolote.

(PA201) 2nd grade

(4)

el[(self-corrected)]

Ellos le respondieron que no podían hablar con él porque era del mundo de arriba y ellos del corazón del mundo.

(JA405) 4th grade

(5)

grandes[(self-corrected)] *cuerpos*[(not self-corrected)]

Sus guardianes eran dos serpientes: una tenía dos cuernos y un dibujo blanco en forma de cruz en la frente.

(JL612) 6th grade

(6)

parecían[(not self-corrected)]

… comenzaron a arreglarlo para que al ponerle en la cabeza los cuernos pareciera un venado de verdad.

(FP412) 4th grade

Writing

(1)

RP203 substitutes 'rabbit' with 'deer' – a discourse level correction for coherence involving previous and subsequent context.

… a rock there it was the rabbit the man was very hungry …

In the following passage 'nos' [us] substitutes 'no' [no], correcting an error of sentence grammar and meaning. Subsequent sentence context potentially triggers the self-correction.

Corrected version: she told him where is the deer that you promised us I am very hungry …

(2)

In a Nahuatl-language text, HF604 substitutes Spanish-language nonce borrowings with Nahuatl-language equivalents or near equivalents: (Spanish) 'but' with (Nahuatl) 'and', (Spanish) 'fathers' and 'mothers' for (Nahuatl) equivalents. Scored as discourse-level/pragmatics revision to conform to task expectations.

Reading

(3)

PA201 self-corrects 'gets ready to angry' with 'became very angry' – correction possibly prompted by subsequent context.

(4)

JA405 self-corrects ' … they couldn't speak to him because he was the world of above … ' with ' … he was from the world of above … ' – correction possibly prompted by subsequent context.

(5)

JL612 self-corrects 'His big … ' with 'His guardians were two snakes: one had two horns and a white drawing in the form of a cross on the forehead'. Notably, there is no attempt to self-correct the syntactically and semantically compatible reading error 'bodies' for 'horns'.

(6)

For contrast, note the failure by FP412 to self-correct 'appear' (plural) with 'appear' (singular) given both prior and subsequent disconfirming context – failure to correct an ungrammatical sentence pattern hypothetically correlating with incipient language awareness.

the system of Aztec symbols can most accurately be described as representing an early stage of transition toward a complete writing system marked by its experimentation with the selective phonetic adaptation of pictographs (rebus principle). The examples of adapted pictograms, for example for place names, represented a potential early precursor to a syllabary or alphabet (Manrique Castañeda, 1988; Prem, 2008). In contrast, the Mayan morphosyllabic writing system has been shown to possess the full capability of high-fidelity transcription of any Mayan expository or literary work of the oral tradition of any length and complexity, including narrative and poetry. The resulting text could be reliably read by a literate speaker of the language without extensive previous knowledge and supporting contextual information. Extensive prior knowledge and context are essential when 'interpreting the meaning' of a pictographic display. Its use to support a fixed oral discourse already committed to memory would be an example of this relationship. In contrast, ancient Mayan writing encoded the actual linguistic constituents, of the syntax, morphology and phonology.[3] To say that such a text was language-dependent means that the reader needed to possess linguistic competence in a *specific language or specific languages of the Mayan linguistic family* with which the orthography was aligned.

Revealing is the criticism of the findings of the Mayan literacy research in an article published in *Reading Research Quarterly* (Jiménez & Smith, 2008) making reference, coincidentally, to fieldwork in Puebla state in close proximity to our Spanish–Nahuatl bilingual project. Aside from the failure to clearly distinguish between pictographic systems and language-based writing, what the article reveals is a fundamental misunderstanding of the conclusions of the Mayan language-writing project. It effectively underestimates the importance of the historical achievement itself, the discovery of which today is widely recognised in the field. In taking issue with Coe's proposal (p. 25) that 'all known writing systems are partly or wholly phonetic, and express the sounds of a particular language' Jiménez and Smith misleadingly argue for the need, in regard to the use of the term 'phonetic,' to 'distinguish between systems that encode the phonemes of a particular language' and those that cue other constituents (p. 36). But in the literature the term 'phonetic' refers to the general category of phonological pattern, not just to 'phonemes'. For example in Chinese writing, characters usually consist of a semantic radical and a phonetic. No orthographic element or stroke pattern in characters maps onto the phonemes of Chinese; rather the phonetic corresponds to the syllable level units of the phonology (Pan et al., 2016). Similarly as in Mayan characters, the phonetic components map onto syllables. More precisely, it has been shown that Mayan writing was morphosyllabic, remarkably parallel in its design to the adaptation of Chinese characters by the East Asian cultures that received the influence of China. As Coe points out, the most interesting comparison is to the hybrid system of Japanese writing: for example, morphosyllabic *kanji* for content morphemes, purely syllabic (or moraic) *kana* for functional morphemes.

Coe differentiated between the qualitatively different design features of pictographic documents and morphosyllabic writing not out of a vague neglect to be inclusive, but rather because, precisely, morphosyllabic scripts allow for the full transcription of language as it is spoken; pictographic systems do not. For this reason, the work of decipherment went hand in hand with the successful reconstruction of the ancestral Mayan languages. As *Breaking the Maya Code* explains in detail, language recovery is a requirement of decipherment because the writing system must be aligned with a spoken language, with its phonology in particular. The research question now posed is whether further evidence can be found to support the conclusion that the invention by the Mayas of this advanced language processing technology allowed in turn for new capabilities in expression and creativity.

In this regard, it is important to reiterate that the alphabetic writing system that 16th-century Spanish missionaries invented for Nahuatl was rapidly adopted by the surviving educated elite of the former indigenous empire, appropriated as well for independent expression and legal and political advocacy. The literary, ecclesiastical and documentary purposes of written Nahuatl were prominent for approximately 100 years, as in the seminars celebrated at the famous Colegio de Tlatelolco, before receding in prestige and utility, relative to Spanish, during the seventeenth century (Fountain, 2015; León-Portilla, 1996; Rosas Xelhuantzi, 2018).

Learning how writing systems represent speech

The debate on the defining characteristics of pictographic-type documentation and language-based writing directly engages the discussion of the language awareness hypothesis. Discounting the importance of the discovery of the link to phonology in the case of the Mayan script suggests an approach to studying writing that deemphasises this link in general. The same approach might then be extended to the study of literacy learning that also questions the importance of language awareness, including phonological awareness.

Understanding how children learn the mapping between their native language and the writing system of their culture is also relevant to Olson's *literacy hypothesis*. 'Language' and 'writing' cannot be reduced to 'meaning'. In the mastery of skilled reading and writing, awareness of language helps the learner focus attention on the constituent patterns of words and phrases. 'Holistic' theories of literacy, popular in the educational field for many years, failed to clearly distinguish among the components of reading ability because they underestimated the importance for learners of mastering the system of how graphemes map onto the sound patterns of language. The failure could be traced to an ill-defined emphasis on top-down meaning construction while deemphasising the language form-writing form correspondences essential for efficient decoding. One of the errors of early 'whole language' models of reading was to assume that processing of written text is heavily dependent on background knowledge and prediction, thus minimising the role of phonological awareness and accurate word identification (Ehri, Nunes, Stahl, & Willows, 2012; Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001).

More directly to the controversy, Olson's *literacy hypothesis* is based on the growing consensus today in the psycholinguistics of literacy that full writing systems represent the morphological and phonological patterns of the language, the language with which a specific orthography is aligned. That even in orthographies of deep irregularity, readers do not by-pass phonology when decoding for meaning in silent reading. Historical examples suggesting that early civilisations experimented with visual representations that directly linked symbols to concepts and images (by-passing speech) does not contradict the principle of language form-writing form correspondence. Where pictographic-type systems emerged, if they survived and evolved to represent language, the representation of morphology and phonology in the units of the writing system became part of their design.[4]

Recognising that language awareness also develops in the oral tradition does not support the attempt to minimise the unique contribution of literacy in attaining advanced text-based language proficiencies, necessary for modern scientific methods of inquiry. In addition, this understanding of the *literacy hypothesis* (Olson & Oatley, 2014) is compatible with the evidence that language awareness begins to emerge in childhood prior to literacy learning. It is also compatible with the observation that adults, who do not read or write, but who have been immersed in the oral tradition secondary discourse of their culture also develop corresponding levels of language awareness. Along the same lines, the repeated finding from different fields of study that literacy depends on language, including its sub-component domains, undermines the attempt to relativise the distinction between full, language-based, writing and pictographic-type communication. The principle of language-literacy dependence in turn helps us avoid confounding language competence and language awareness, useful for example in the research on the interactions and interfaces among the components that participate in reading ability—the linguistic subsystems, the visual system, working memory, and so forth (Eviatar, Taha, & Shwartz, 2018; Kjeldsen, Kärnä, Niemi, Olofsson, & Witting, 2014; Schaars, Segers, & Verhoeven, 2018). Lastly, the competence–awareness distinction does not contradict the principle of language-literacy dependence. Just as language awareness builds upon language competence, literacy (as does advanced SDA) also builds upon language competence.

Conclusion: understanding context

Returning to the problem of processing contextual information, Olson (1994) addressed the difference mentioned above about the two kinds of context in a series of experiments with young

children, on the so-called 'say-mean' distinction. The thought problem is about a precursor of school literacy. Advanced literacy, and cognitively demanding language comprehension in general, is sometimes characterised as 'decontextualised'. We can see how the term lends itself to misunderstanding, but the idea of decontextualising comprehension tries to describe an important aspect of language awareness. Prior knowledge schemas are obviously important in processing new, textual, information. At the same time, new information can also conflict with, 'challenge', background concepts and culture-specific predisposition, such that accurate and reliable decoding and 'close reading' become even more important for comprehension. In this case, the reader (or listener) needs to apply 'bottom-up' type comprehension strategies to be able to decouple text meaning (what the words 'say') from a highly context-dependent meaning based on prior knowledge frames. The reader/listener then holds 'the wording' and preconception-based understanding up to scrutiny and comparison. In the (2009) paper, Olson underscores the mental confrontation that metalinguistically aware readers engage in, comparing 'literal meaning' and interpretation driven by potential bias or by regulating authority. The 'careful reading of words in *their* context' (emphasis added) is facilitated by language awareness (p. 56). Successful comprehension depends on both access to relevant prior knowledge *and* accurate decoding, as truly interactive models of reading propose (Stanovich, 2000). In our study of reading repair and self-correction/revision of compositions, an analogous process came into play: after committing an error, the most successful literacy learners prioritise precision in subsequent word identification, engaging language awareness strategies. Interestingly, in the writing-editing task, while students of all levels successfully attempted spelling correction, revision at the discourse level (with coherence in mind) was attempted almost exclusively by the older and more experienced writers.

Redefining the concepts of writing and literacy for the purpose of blurring distinctions parallels the redefining of language with the same end in mind. There is nothing wrong in general in the use of the informal, broad or metaphorical sense of 'literacy' to mean 'ability' or 'knowledge', as in 'computer literacy'. Similarly, in the comparative study of animal communication systems, we make reference to the 'language' of bees and prairie dogs. Authors sometimes use the term 'language' to refer exclusively to relationships of meaning or to kinds of (non-linguistic) information system. But in the discussion of actual empirical research, it is necessary to distinguish between the broad versus narrow sense in these instances. Even intuitively, in 'read the thermometer' versus 'read the report' it's clear to most people that we are talking about different kinds of skill and knowledge. Again, there is no reasonable objection in general to extending the reference or meaning range of words. Then we would simply assume that different questions and problems are being considered in the broad sense of 'literacy' and 'language', here, not relevant to the topic of this discussion: advanced literacy for higher-order classroom language proficiency and concept learning.

A similar research problem to the one of school-based literacy learning in general is that of second language learning for academic purposes, in the case of Spanish as second language in Mexico or English as international language. Here again clarity on the use of terms such as 'reading', 'writing' and 'bilingual' is important for better understanding the defining characteristics of high-stakes learning in school. Interestingly, the language-writing correspondence theory helps us better understand the differences between initial literacy learning in the first language and in the second language. This research problem of cross-language literacy with which we began the discussion now deserves new attention in light of the progress that has been made in the field.

Notes

1. In contrast to the research on historical continuities between the oral tradition and literacy, the Nahuatl–Spanish bilingual project has only been able to provide correlational data from the comparison of

performance on a series of spoken and written narrative tasks, suggesting so far a plausible working hypothesis for future investigation (Francis & Navarrete Gómez, 2014; Chireac & Francis, 2016).

2. This observation regarding the comparison between Mayan writing and Aztec pictography should actually go without saying. On a related point, researchers all acknowledge that the evidence of Mesoamerican writing and symbolic systems is based on a limited sample, documents that survived the massive purge and destruction of libraries and archives during the Spanish conquest. New discoveries might lead us to revise some descriptions and assessments. Until then we must rely on the available data, which nevertheless strongly support the conclusions of the Mayan writing investigators.
3. The close alignment of phonological constituents to graphemes is sometimes associated with expository writing, over and above other text types. But evidence from the study of script re-alignment in the design of new writing systems (e.g. adaptations from Literary Chinese to vernacular Korean, Japanese and Vietnamese) shows that the poetic genres required *at least* the same degree of close correspondence for purposes of faithful rendering of wording (Nguyễn, 1975; Phan and Francis, 2019).
4. A better concluding quote for the (1991) paper than the one from *The Gutenberg Galaxy* would have served clarity on the question of how phonology is represented in writing. In 1962, McLuhan didn't have the benefit of recent findings on morphosyllabic literacy, reason for the error: 'Only the phonetic alphabet makes a break between eye and ear, between semantic meaning and visual code; and thus only phonetic writing has the power to translate men from the tribal to the civilized sphere … ' (quoted in Olson, 1991: 27). Nevertheless, McLuhan should have suspected from indirect evidence (for one, the rapid development of modern literature and science in China beginning with the fall of the Qing Dynasty in 1911) that this assertion could not be correct. The research on writing systems has converged on the conclusion that, as does alphabetic writing, morphosyllabic writing encodes the relevant linguistic subsystems for complete transcription.

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