UNIVERSITAT DE BARCELONA

M.A. Thesis

The Crosslinguistic Role of Morphological Awareness in Reading: A State-of-the-Art Review

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Academic year: 2018-2019

Official M.A. program in

Applied Linguistics and Language Acquisition in Multilingual Contexts (LAALCM)

Universitat de Barcelona

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Acknowledgements

I would like to thank my supervisor Dr. Roger Gilabert for his valuable comments on earlier versions of this thesis and for his organisational support when things didn't go as planned. I would also like to express my gratitude to Dr. Rosa Sánchez Tomé for her constructive feedback, and Dr. Elsa Tragant for her advice and recommendations of resources for writing review articles.

Abstract

Language learners and developing bilinguals may draw on morphological awareness from one language when reading in another, and the past two decades have seen a surge in research investigating when this occurs, and which factors affect it. This master's thesis provides a review of the literature on the topic to date. I begin by describing the theoretical background and methodological approaches used in morphological awareness research, followed by an overview of findings on the development of morphological awareness and similarities and differences in its role in reading in L1 and L2. I then turn to morphological awareness transfer in reading, synthesizing recent research findings, before what results show us about the nature of morphological awareness and factors which have been identified as affecting its transfer during reading. This review shows that, while language characteristics, typological distance, L1 literacy skills, L2 knowledge and print exposure are all important, a series of theoretical and methodological issues limit the generalizability of findings to date. I conclude by providing recommendations for future research on the topic.

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1. Introduction to the Study

In recent years, increasing attention has been focused on the contribution of morphological awareness to a range of first (L1) and second (L2) language reading outcomes. While morphology has often been regarded as language-specific and not prone to transfer (Lignos & Yang, 2017) there is ample evidence that morphological awareness includes some sort of crosslinguistic component (Jarvis & Pavlenko, 2007; Hayashi & Murphy, 2012; Besse, Leite Moreira Roganti, & Vidigal de Paula, 2015). However, ongoing theoretical and methodological considerations, in addition to the inevitable complexity of research covering a range of contextual, linguistic and learner characteristics, make it difficult to obtain a clear picture of role of morphological awareness in bilingual literacy. The aim of this paper is therefore to bring together key findings from recent and current research in order to provide an overview of the current state of a rapidly developing field.

Morphological awareness has been identified as contributing to a range of reading skills in first and second languages (Carlisle, 2003; Hu & Schuele, 2015; Alderson, Nieminen & Huhta, 2016). A better understanding of the crosslinguistic nature of morphological awareness may therefore provide insight into second language acquisition processes and the relationships between reading ability in L1 and L2, facilitate the identification of causes of reading difficulties for minority language students, and help to evaluate language teaching strategies.

It is important to note that, in general, research on morphological awareness in this study does not specifically address different theoretical models of crosslinguistic influence. While most, if not all articles appear to be working within a framework compatible with either Cummins' (1979, 1980) Linguistic Interdependence Hypothesis or Cook's (1992, 2013) multicompetence perspective, only a small number of studies included in this review use their results to evaluate theories of transfer or elaborate their own models (e.g. Koda, 2008).

This master's thesis takes the form of a state-of-the-art article. State-of-the-art reviews aim to bring together recent and current developments in a particular field with the aim of not only critically evaluating key findings, but also identifying where expectations may not have been met, methodological weaknesses, and future directions for research, in a way accessible for both specialists and those looking for an up-to-date introduction to the topic (Language Teaching, 2014). Review articles may also identify patterns and relationships which are not immediately evident and identify gaps in the literature (Norris & Ortega,

2006). While reference is made to related fields where relevant in order to provide further insight, this review limits itself specifically to articles on the role of morphological awareness in literacy research.

To my knowledge, the only review article covering this topic is by Casalis and Commissaire (2018), which takes a rather different perspective: their focus on *morphology* in second language reading means that their article covers a wider perspective, including L2 morphological processing research and discussions of the relationship between morphology, phonology and orthography. In contrast, the present study has a narrower focus on *morphological awareness* as a psychological construct rather than *morphology* as a linguistic category (see page 4 for a discussion of definitions).

Chapter two of this thesis provides a brief overview of how morphological awareness is defined and operationalised in reading research. Chapter three summarises research on the within-language contributions of morphological awareness to L1 and L2 reading outcomes – namely word reading accuracy and fluency, sentence- and passage-level reading comprehension and lexical inferencing. Chapter four brings together findings on the crosslinguistic role of morphological awareness for developing bilingual and foreign language learners. Chapter five evaluates theories considering the crosslinguistic nature of morphological awareness and the linguistic, contextual and participant characteristics which have been identified as affecting it. The review closes with a brief summary of the findings and limitations of this study, and provides recommendations for future research on the topic.

2. Morphological Awareness Research

Background

Morphology is the study of meaning-carrying units of language. Morphemes may be whole words (free morphemes), root morphemes, which provide semantic information, or affixes (bound morphemes), which communicate grammatical or further semantic information. Three types of morphology exist: inflectional morphology modifies the grammatical category of a word without changing its core meaning (e.g. *dance*, *dancing*, *danced*), derivational morphology forms a different word via the addition of affixes (e.g. *happy*, *unhappy*, *happiness*), and compound morphology creates a new word by combining root morphemes (e.g. *footpath* from *foot* and *path*). Morphological awareness is the ability to reflect on and manipulate this morphemic structure of words.

Cognitive approaches to reading see the fluent comprehension of text as dependent on the seamless integration of a series of mental processes and the readers' linguistic and general knowledge in working memory. Lower-level processes extract meaning from letter-, word- and clause-level information while higher-level processes integrate information from a text with the readers' background knowledge, draw inferences and use discourse-level clues to interpret meaning (Perfetti, van Dyke & Hart, 2001; Grabe, 2009). While morphemes as linguistic elements are defined as the most basic meaning-carrying units, morphological awareness as a construct is rather complex, involving the integration of semantic information with its orthographic and phonological representation and knowledge of rules determining possible combinations of morphemes (Carlisle, 2003; Kuo & Anderson, 2006). Consequently, much research on morphological awareness uses statistical modelling to identify the extent to which measures of different components, such as morphological and phonological awareness, vocabulary knowledge and others, independently contribute to reading outcomes and interact with other measures (Schatschneider & Petscher, 2011). In general, the amount of unique variance explained by morphological awareness is rather small and, in many cases, may not reach statistical significance, at least partly due to high correlations with closely-related skills (such as phonological awareness and vocabulary size). However, researchers have emphasised that low explanatory power identified in statistical analyses should not lead to an underestimation of morphological awareness' importance in instructional practice (Nagy, Carlisle & Goodwin, 2014).

The role of morphological awareness in many influential theories of reading – such as Ehri's (1995, 2005) four phase model of reading development, the Simple View of

Reading (Gough & Tunmer, 1986; Language and Reading Research Consortium, 2015; Catts, 2018), Perfetti and Stafura's (2014) Reading Systems Framework, or learning-based models of linguistic processing (Milin, Smolka & Feldman, 2017; Feldman & Milin, 2018) – has been either marginal or relatively unclear, with attention primarily focusing on decoding skills, phonological awareness, lexical knowledge or patterns of activation. Without a clear theoretical model much research on morphological awareness – and especially its crosslinguistic nature – has been largely exploratory in nature, aiming to describe and expand knowledge of phenomena observed in previous studies rather than testing models of reading or language transfer.

The last two decades has seen a dramatic increase in research on the role of morphological awareness in reading (see Berthiaume, Bourcier & Daigle, 2018), largely as a result of its identification as a long-term contributor to reading comprehension across elementary education and beyond (Tyler & Nagy, 1989; Carlisle, 2000; Nagy, Berninger & Abbott, 2006; Berninger, Abbott, Nagy & Carlisle, 2010) and as a possible source of reading difficulties (Deacon, Parrila & Kirby, 2008). While a crosslinguistic dimension of morphological awareness had been previously identified in research with closely related languages (e.g. Hancin-Bhatt & Nagy, 1994), a series of studies finding that morphological awareness measured in one language predicted reading outcomes in another in the mid-2000s (Kahn-Horwitz, Shimron & Sparks, 2005; Wang, Cheng & Chen, 2006; Deacon, Wade-Woolley & Kirby, 2007) led to a surge in interest in morphological awareness transfer.

Definitions of Morphological Awareness

Concern has been raised about inconsistent and at times contradictory definitions of morphological awareness (Kuo & Anderson, 2006; Apel, 2014; Berthiaume et al., 2018). While Carlisle's (1995) description of morphological awareness as individuals' 'conscious awareness of morphemic structure of words and their ability to reflect on and manipulate that structure' (p. 194) has been widely used as a working definition, some researchers attempt to separately measure morphological processing – the tacit processing of morphemes – and morphological awareness – the ability to apply word formation rules and language-specific morphological knowledge to analyse and manipulate morphemes (e.g. Bowers Kirby & Deacon, 2010; Deacon, Tong & Francis, 2017; Levesque, Kieffer & Deacon, 2018). However, it is difficult to separate the two constructs in theory (Nagy et al.,

2014; Berthiaume et al., 2018) and the operationalization of the two in practice has been inconsistent.

Tyler and Nagy (1989; see also Kuo & Anderson, 2006) define three types of morphological knowledge required for a complete understanding of derivational morphology: relational (or lexical-semantic), syntactic and distributional. Relational knowledge is the understanding that words have a complex internal structure and the ability to identify words that share root morphemes. Syntactic knowledge is the tacit awareness of how derivational affixes mark words for syntactic category. Distributional knowledge is an awareness of the constraints that govern the connection of affixes and root morphemes. While these definitions are commonly employed to interpret results, few studies on L2 reading have incorporated measures of all three types of morphological knowledge or specifically investigated whether they differ in terms of crosslinguistic influence.

Instruments Used to Measure Morphological Awareness

Lack of clarity over morphological awareness definitions and differences in the types of morphology measured in studies has resulted in a wide range of task types being used in literacy research (see Appendix for a categorisation and descriptions of morphological awareness measures). Even the same task can differ considerably from one study to the next according to research aims, language features, participant characteristics and theoretical considerations: variations may include presentation in oral or written modes, use of inflectional, derivational or compound morphology, choice of real or pseudowords, controls for phonological or orthographic shifts, the number of questions and so on.

Many studies use multiple measures of morphological awareness which may be combined or entered separately into the statistical analyses depending on study aims and amount of covariance. However, questions remain over whether morphological awareness is a single, unidimensional construct or not (Ke & Xiao, 2015). Some studies using exploratory or confirmatory factor analysis have found morphological awareness results to be better represented by a single factor model (Muse, 2005; Spencer et al., 2015; Tibi & Kirby, 2017), while others have preferred a two-factor model, with real-word and pseudo-word morphology (Tighe & Schatschneider, 2015, 2016) or analytical and productive task demands (Bourdages & Foucambert, 2018) representing distinct dimensions of morphological awareness. If morphological awareness is a multidimensional construct, different morphological awareness tasks may not tap into the same competence.

The lack of clear definitions, theoretical models and the variety of instruments used indicate that research into morphological awareness and its crosslinguistic contribution to reading is still a maturing field. Nevertheless, as the following chapter will demonstrate, increased interest in morphological awareness has led to a richer understanding of its role in reading in both first and second languages.

3. The Within-Language Role of Morphological Awareness for Reading

While morphology exists in every language, its characteristics and contributions to reading vary according to its relationship with other language characteristics (Kuo & Anderson, 2006). Research on within-language contributions of morphological awareness to reading has therefore focused on questions regarding the nature of morphological awareness' contributions to the reading process, relationships between reading problems and morphological awareness deficits, how the relationship between morphological, phonological and orthographic awareness differs for reading across languages, and whether L2 readers draw on L2 morphological knowledge in the same way that L1 readers do.

The Development of L1 and L2 Morphological Awareness

Evidence of L1 morphological awareness emerges at a young age in oral communication and develops over the course of literacy acquisition, first appearing as a receptive skill before productive ability develops (Tyler & Nagy, 1989; Ku & Anderson, 2003; Fejzo, Descrochers & Deacon, 2018; Duncan, 2018). The onset of formal literacy instruction leads to rapid growth in morphological awareness and development continues throughout elementary education (Singson, Mahony & Mann, 2000; Berninger et al., 2010), providing a vital skill for tackling the rapidly increasing number of morphologically complex academic words that children encounter over the course of their education (Anglin, 1993; Carlisle, 2003, 2010). Low morphological awareness can be a source of reading difficulties (Deacon et al., 2008) and word formation instruction has been found to consistently boost reading outcomes for both poor and normal readers (Bowers, et al., 2010; Carlisle, 2010; Nagy et al., 2014; Goodwin & Ahn, 2010). It is worth noting that the development of morphological awareness and literacy are to a certain degree reciprocal (Kruk & Bergman, 2013): while weaker morphological awareness negatively affects reading growth, low exposure to text hinders the development of morphological knowledge and processing (Deacon et al., 2008)

The development of second language morphological awareness shares many characteristics with its L1 counterpart, developing in close relation to other linguistic skills and impacted by individual cognitive differences and context-related factors. Nevertheless, the development of L2 morphological awareness differs in two major ways. Firstly, the existence of an already-existing language system means that skills and knowledge developed in the L1 are employed, where appropriate, for morphological processing in the L2 (e.g. Koda, Takahashi & Fender, 1998; Koda, 2008; N. Jiang, Novokshanova, Masuda & Wang,

2011; Hayashi & Murphy, 2013). The second major factor is differences in exposure and instructional settings. Advances in first language morphological awareness occur as children learn to objectify a language they are already adept at using and have extensive exposure to. In contrast, second language learning generally makes use of explicit rule knowledge from the beginning and learners are exposed to considerably less linguistic input.

The dual effect of the L1 and exposure to the target language on morphological awareness is highlighted in a unique study by D. Zhang and Koda (2012). The participants were students in a public elementary school in an area of north-eastern China where there was little contact with the English language outside of school and the course book was the primary language source within lessons. Results indicated that performance in morphological awareness tasks reflected typological and exposure conditions: for English inflections and derivations – which have no comparable equivalents in Chinese – scores were significantly higher for inflections, which appeared considerably more frequently in their study materials. In the case of compound and derivational morphology, to which to students had similar amounts of exposure, compound results were better due to similarities between English and Chinese compound morphology rules.

The general picture derived from current research is that the development of L2 morphological awareness is fully compatible with current theories of crosslinguistic influence: common underlying metalinguistic awareness competencies afford language learners a higher degree of analytical sophistication than during L1 development, allowing for rapid progress. While common features in L1 and L2 greatly facilitate learning, L2 morphological awareness develops primarily through increased L2 knowledge and exposure to texts (Koda, 2008).

Within-Language Contributions of Morphological Awareness to Reading

Morphological awareness has been identified as a within-language predictor of a range of reading-related outcomes such as word reading, lexical inferencing and reading comprehension for L1 readers of various languages, including Arabic (Abu-Rabia, 2007, Tibi & Kirby, 2017), Chinese (McBride-Chang, Shu, Zhou, Wat & Wagner, 2003; D. Zhang, 2017), English (Kirby, Deacon, Bowers, Izenburg, Wade-Woolley & Parrila, 2012), French (Casalis & Louis-Alexandre, 2000; Sanchez, Ecalle & Magnan, 2012), Greek (Pittas & Nunes, 2014; Manolitsis, Grigorakis & Georgiu, 2017), Hebrew (Deutsch, Frost, Pelleg, Pollatsek & Rayner, 2003; Norman, Degani & Peleg, 2016), Korean (E. Cho & Tong, 2014),

Portuguese (Ferreira de Oliveira & dos Reis Justi, 2017) and Spanish (Ramírez Quilape & Martínez Jiménez, 2016).

In L1 word reading, skill in identifying the morphemic structure of complex words, which allows the activation of the root morpheme and affixes in the mental lexicon, aids the accurate and fluid pronunciation of words (Carlisle & Nomanbhoy, 1993; Carlisle & Stone, 2005; Abu-Rabia, 2012). Parsing a complex word into its morphological components can also speed up the processing of low-frequency words (e.g. by segmenting *hilly* into its frequent constituent parts, root *hill* and suffix *-y*) and clarify potentially ambiguous pronunciation (e.g. knowledge of the prefix *mis-* in *mishandle* will allow the reader to correctly pronounce *mis-handle* rather than *mish-andle*) (Kuo & Anderson, 2006).

For bilinguals and multilinguals, experimental morphological processing studies have demonstrated that readers automatically segment words into their constituent parts – though not always correctly – from the early stages of reading, although there also exists evidence for whole-word processing (see Gor, 2010, for a discussion). In literacy studies, morphological awareness measured in the second language has been found to predict L2 word-reading for a wide range of groups, including minority language speakers in mainstream education (Ramírez, Chen, Geva & Kieffer, 2010), students in immersion programmes (Deacon et al., 2007) and foreign language learners (Choi, Tong, Sin & Cain, 2018; Besse, Marec-Breton, Leite Moreira Roganti & Gombert, 2019). Some cases where L2 morphological awareness was not found to be a significant direct predictor of L2 word reading, such as in the case of L1 English learners of Arabic (Saiegh-Haddad & Geva, 2008) are easier to explain: the word reading task used voweled Arabic, meaning participants could rely solely on phonological information. For others, such as D. Zhang's (2017) study on heritage learners of Mandarin in Singapore, the reason is less clear: a lack of a significant effect may be due to differential development trajectories in between oral and literary skills, or alternatively it may reflect the weaker and more irregular nature of L2 morphological processing (see Clahsen, Felser, Neubauer, Sato & Silva, 2010)

For first-language lexical inferencing – the guessing of the meaning of unfamiliar words encountered while reading – the same segmentation skills which enhance word reading efficiency allow a child who encounters the word *undrinkable* for the first time to be able to identify the meaning of the word due to their existing knowledge of root *drink* and affixes *un-* and *-able* (Nagy et al., 2014).

L2 morphological knowledge has also been identified as a frequent (Comer, 2012) and effective (Parabikht & Wesche, 1999) linguistic resource that language learners draw on when attempting to identify new words, so it is unsurprising that morphological awareness

has been found to be both a direct predictor of L2 lexical inferencing success (D. Zhang, Koda & Leong, 2016) and an indirect predictor via L2 linguistic knowledge (Ke & Koda, 2017) for language learners. Various reading studies (Nagy, García, Durgunoğlu & Hancin-Bhatt, 1993; Jiménez, García & Pearson, 1995; Y. Jiang, Kuo & Sonnenburg-Winkler, 2015) demonstrate that skilled readers are much more successful than poor readers at analysing word structure to identify root morphemes, identify cognates, and use affixes to determine the grammatical role of words in a sentence.

In addition to word-level skills, morphological awareness has also been found to contribute to reading comprehension for L2 readers at different ages and skill levels (Pittas & Nunes, 2014; Deacon & Kirby, 2004; Jeon, 2011; Lam, Chen, Geva, Luo & Li, 2012; Deacon et al., 2017; Tighe & Schatschneider, 2016). There are many reasons why this might be the case. Firstly, one of the strongest effects of morphological awareness comes from its close relationship with vocabulary learning (Carlisle, 2007; McBride-Chang, Wagner, Muse, Chow & Shu, 2005; McBride-Chang et al., 2008; Muse, 2005), especially of academic vocabulary, which tends to be morphologically complex (Kieffer & DiFelice Box, 2013): morphological awareness can help word identification, storage and retrieval in memory (J. Zhang, Lin, Wei & Anderson, 2014), and in the early stages of literacy development morphological awareness may be closely related to overall the child's overall level of metalinguistic sophistication (Nagy, 2007).

The syntactic aspect of morphology is a second possible explanation for links between morphological awareness and reading comprehension. Morphology encodes information on a word's grammatical role in the sentence which may be particularly important in the comprehension of decontextualized academic texts (Koda, 1993; Nagy, 2007; Nagy et al., 2014). It is rare for specific measures of syntax to be included in literacy studies, and it has been hypothesised that syntactic information encoded in derivational affixes may be a source of morphological awareness' contribution to sentence-level reading comprehension (Kieffer, Biancarosa & Mancilla-Martínez, 2013).

A third possibility is that morphological awareness may strengthen lower-level linguistic knowledge and processing, which is a prerequisite for efficient higher-level processes used in text comprehension (Kahn-Horvitz et al., 2005). As morphology encodes information regarding word form, meaning and grammatical role, higher morphological awareness may signify stronger connections between these areas of knowledge, allowing readers to draw on this knowledge more efficiently and accurately (Nagy et al., 2014; Kirby & Bowers, 2017). Kirby and Bowers (2017) underline the role that morphological awareness may have in strengthening what Perfetti (2007) terms lexical quality: depth of knowledge of

a word's orthography, phonology, grammar and meaning, and the nature and strength of the connections between them.

A final possibility relates to the role of working memory. D. Zhang et al. (2014) hypothesize that, as the simultaneous process of decoding words, remembering and actively processing text during reading occurs in working memory, sensitivity to morphological structure may improve working memory capacity. In contrast, unskilled readers – who have to store morphologically complete complex words in working memory during the processes of decoding, lexical accessing and meaning inferencing – will have less working memory available to attend to higher-level processing compared to those who can segment words efficiently. However, while contributions of working memory to reading comprehension have been found for L1 and L2 readers (Geva & Ryan, 1993; Siegel, 1994; Seigneuric, Ehrlich, Oakhill & Yuill, 2000; Cain, Oakhill & Bryant, 2004; Cain, 2006), to my knowledge the causal link between morphological processing and working memory capacity has not been empirically tested.

The within-language contribution of L2 morphological awareness to reading comprehension has been identified in various studies. English derivational morphological awareness was found to directly contribute to reading comprehension for L1 Spanish children in English-medium primary and middle schools (Kieffer & Lesaux, 2008, 2012a; Kieffer & DiFelice Box, 2013; Ramírez, Chen, Geva & Luo, 2013), and the predictive power increased over time (Kieffer & Lesaux, 2008). Measures of morphological awareness were also found to predict reading comprehension in that same language for Korean-English bilingual children in Grades 2, 3 and 4 (Wang, Ko & Choi, 2009). In foreign language contexts, mixed results were found in Jeon's (2011) study, where the derivation task (see Appendix for description) was found to predict reading comprehension for L1 Korean tenth grade learners of English while the fluency task was not, and no direct contribution of English morphological awareness on English reading comprehension was found in D. Zhang & Koda (2012) study of adult engineering students in Shanghai.

This brief overview shows that, despite the differences in the learning conditions and proficiency between reading in a first and second language, morphological awareness appears to contribute to literacy achievement similarly in both first and second languages: learners' ability to analyse the internal structure of words allows for efficient lexical access and provides clues for pronunciation. Furthermore, it is a major resource for identifying the meaning of unknown words, and may help reading comprehension in multiple ways.

4. Crosslinguistic Contributions of Morphological Awareness to Reading

Background

Reading in a second language is a fundamentally crosslinguistic activity, drawing on both L1 and L2 processes and knowledge, and a wide range of factors have been identified as influencing L2 reading outcomes including L1 reading ability and experience (Fecteau, 1999; Sparks, Patton, Ganschow & Humbach, 2012), individual differences in linguistic processing (Geva & Ryan, 1993), explicit literacy awareness (Schoonen, Hulstijn & Bossers, 1998), typological distance between L1 and L2 language features (Koda, 1990), L2 linguistic knowledge (Koda, 1992; Walter, 2007), and L2 text experience (Beglar, Hunt & Kite, 2011; Nakanishi, 2015).

Component reading skills have been identified as differing in crosslinguistic character: phonological awareness is a competence that is more easily applied across known languages (Durgunoğlu, Nagy & Hancin-Bhatt, 1993; Melby-Lervåg & Lervåg, 2011), whereas decoding ability requires more language-specific knowledge and so need to be developed separately for each language or writing system (Bialystok, McBride-Chang & Luk, 2005). The crosslinguistic nature of morphological awareness is less clear, and it has been hypothesised that transfer may occur at two levels (Koda, 2000; Ramírez et al., 2013): skill-level and knowledge-level. If only knowledge-level transfer exists, the expectation would be that measures of morphological awareness solely predict reading outcomes for languages which share morphological features. Skill-level transfer on the other hand could be evidenced by contributions of morphological awareness to reading even in typologically distant languages. Another possibility, proposed by Kahn-Horwitz et al. (2005), is that morphological awareness is at least partly governed by a common underlying linguistic competence, which enhances reading measures in another language regardless of linguistic typology. A third explanation is that morphological awareness may positively impact a third unobserved variable such as working memory (e.g. Crain & Shankweiler, 1988), which in turn facilitates second language reading.

The first studies to measure the crosslinguistic predictive power of morphological awareness for reading had a diverse set of aims: Kahn-Horwitz et al. (2005) were aiming to test the Linguistic Coding Difference Hypothesis; Schiff and Calif (2007) framed their study in terms of language distance in crosslinguistic influence; literacy studies investigated how children drew on morphological awareness when learning to read in two languages simultaneously (Wang et al., 2006; Deacon et al., 2007). The identification of crosslinguistic

contributions of morphological awareness to reading measures in three of these four studies prompted further research on the nature of this relation and the factors constraining it, including the effect of age (Tong & McBride-Chang, 2010; J. R. Cho, Chiu & McBride-Chang, 2011), L2 development (Besse et al., 2019), role of language of instruction and environment (Tong et al., 2018), the effect on different learner types (Ramírez et al., 2010), linguistic distance between L1 and L2 (D. Zhang, 2013), cognates effects (Ramírez et al., 2013), different types of reading measures (Pasquarella, Chen, Lam, Luo & Ramírez, 2011), and L3 transfer (E. Cho & Tong, 2014).

Research Findings

The between-language predictive power of morphological awareness has been identified on a range of literacy measures. The direct contribution of morphological awareness on word reading accuracy has been observed both from L1 to L2 (Kahn-Horwitz et al., 2005; Deacon et al., 2007; J. Cho & Lee, 2010; Ramírez et al., 2010, 2013), from L2 to L1 (Deacon et al., 2007; Saiegh-Haddad & Geva, 2008; Tong et al., 2018), and also for developing early bilinguals (Wang et al., 2006, 2009). Notably, Deacon et al. (2007) reported bidirectional crosslinguistic contributions of morphological awareness to reading in the same sample. Predictive power has equally been found for measures of word reading fluency (Saiegh-Haddad & Geva, 2008; Besse et al., 2019).

Indirect crosslinguistic contributions of morphological awareness to lexical inferencing have also been identified: in the first, L1 Chinese compound awareness was found to be a predictor of English lexical inferencing, mediated by English compound awareness and Chinese lexical inferencing (D. Zhang & Koda, 2012). A similar relationship was found in a longitudinal study on bilingual 3rd and 4th Grade Malay children in English-medium education in Singapore, with English derivational morphology predicting Malay lexical inferencing via Malay morphological awareness and English lexical inferencing (D. Zhang et al., 2016).

A small number of studies have found significant crosslinguistic relationships between morphological awareness and reading comprehension measures. Two studies on bilingual Chinese-English children found unique variance in reading comprehension explained by compound awareness in the language, with different directions of influence in each case (Pasquarella et al., 2011; Lin, Chen & Wang, 2018). In studies on foreign language learners, direct effects were recorded for L1 Korean derivational morphology on reading comprehension in L2 English and L3 Chinese (E. Cho & Tong, 2014), and for L1

Hebrew derivational morphology on L2 English reading comprehension (Kahn-Horwitz et al., 2005). Furthermore, indirect paths to reading comprehension were found for two studies on bilingual children: in the first, Spanish derivational morphology predicted English reading comprehension via English derivational awareness and cognate vocabulary for ELLs, while in the second English compound morphology awareness predicted Chinese reading comprehension via Chinese compound awareness. L1 derivational morphology was also found to be a predictor of L2 reading comprehension for Korean learners of English, mediated by Korean derivational morphological awareness (Choi, 2015).

These studies provide robust evidence that awareness of morphology can play a strong role in various literacy outcomes across languages, even if it appears to be less systematic than within-language contributions (the reasons for this will be discussed in the next section). Furthermore, this influence can be detected in children (Pasquarella et al., 2011; Wang et al., 2009; Tong et al., 2018), adolescents (Ramírez et al., 2013; E. Cho & Tong, 2014) and adults (Choi, 2015); beginner (Kahn-Horwitz et al., 2005; E. Cho & Tong, 2014), intermediate (Deacon et al., 2007; D. Zhang et al., 2016) and more advanced learners (Choi, 2015), for languages which typologically close (Deacon et al., 2007) and more distant (Besse et al., 2019), for bilingual children receiving instruction in two languages (Wang et al., 2006, 2009; Lin et al., 2018), children attending schools in a language which is not their home language (Ramírez et al., 2013) and foreign language learners (Kahn-Horwitz et al., 2005; D. Zhang, 2013; Besse et al., 2019). Furthermore, the transfer can be seen from L1 to L2 (Ramírez et al., 2013; Choi, 2015, Besse et al., 2019), L1 to L3 (E. Cho & Tong, 2014) and from L2 to L1 (Saiegh-Haddad & Geva, 2008; Ramírez et al., 2010; D. Zhang et al., 2016).

Nevertheless, it is difficult to spot clear patterns in the results and two studies – Schiff and Calif (2007) and Tong and McBride-Chang (2010) – found no significant crosslinguistic relations between morphological awareness and reading measures in any of their analyses. In the next chapter I discuss factors identified in the literature as affecting the strength and direction of morphological awareness' between-language contributions.

5. Factors Affecting CLI in Morphological Awareness and Reading

The picture painted by research to date is that learners may draw on morphological awareness in one language when reading in another, but that the strength and directionality of this influence are difficult to predict. Various hypotheses have been put forward to explain this phenomenon, many of which draw on findings from psycholinguistic and second language acquisition research. However, at present it is difficult to evaluate these hypotheses due to wide variations in designs, populations and contexts of each study. Most theories can mostly be classified as based on either linguistic factors, L1 literacy skills or L2 proficiency.

Linguistic Features

One of the clearest conclusions from research to date is that the crosslinguistic influence of morphological awareness is more likely to be identified when the two languages share morphologically congruent features. Languages differ in how meaning is encoded in morphology, and typological proximity appears to greatly facilitate language acquisition and reading comprehension as a consequence (N. Jiang, 2004; N. Jiang et al., 2011). In a crosslinguistic comparison of morphological awareness, Ramírez, Chen, Geva and Luo (2011) found that similarities between L1 and L2 syntactic and distributional properties of the type of morphology measured predicted performance in L2 English: L1 Spanish students performed much more similarly to their L1 English peers in derivational morphology, whereas in the tests of compound morphology it was the L1 English and L1 Chinese students who performed more similarly. The authors attribute these results to typological similarities: English and Spanish share many derivational affixes which do not exist in Chinese, while both English and Chinese compound morphology follow similar rules which differ from Spanish. Similar patterns have been observed in the crosslinguistic predictive power of morphological awareness for reading: compound awareness measured in Chinese and English has been observed to contribute to reading in the other language (Wang et al., 2006; Pasquarella et al., 2011; Lin et al., 2018, Tong et al., 2018), as has derivational morphology between languages where derivations have comparable importance and functions, such as English, Malay, Spanish and Korean (Wang et al., 2009; Ramírez et al., 2010, 2013; E. Cho & Tong, 2014; Choi, 2015; D. Zhang et al., 2016). In contrast, when a type of morphology has very different structures or roles in the two languages, such as

derivational morphology in Chinese and English, no evidence of transfer has been found (Wang et al., 2006; D. Zhang, 2012; E. Cho & Tong, 2014).

Typological proximity in vocabulary is also important. Morphological awareness helps learners identify cognates (Ringbom, 1992; Nagy et al., 1993), and word knowledge is vital to reading success (Nassaji, 2006; Horiba, 2012; Jeon & Yamashita, 2014; Alderson et al., 2016). Consequently, it is unsurprising that strong and consistent crosslinguistic morphological awareness contributions to reading have been found when participants' L1 and L2 share many cognates (Deacon et al., 2007; Ramírez et al., 2010, 2013)

The importance of linguistic similarities supports the notion that the facilitative role of morphological transfer in second language reading comes from the ability to use knowledge or skills learned in one language while reading in another. The fact that this facilitative effect stretches across language families indicates that what transfers is not simply knowledge of affixes or vocabulary but may also be a more general form of metalinguistic analytical ability (Wang et al., 2006) or processing skills (Wang, et al., 2009; Ramírez et al., 2011). The former would allow learners to recognize similarities and differences in form-function mappings and syntactic functions of affixes between first and second language writing, while the latter would facilitate L2 reading by providing efficient segmentation, lexical access, integration of text and background ideas and other reading processes developed in first language reading.

Directionality of Morphological Awareness Effects

Various hypotheses have been put forward to explain the directionality of morphological awareness transfer in reading, but at present contradictory results make it impossible to provide definitive answers.

Results showing a unidirectional transfer of English compound morphology to Chinese reading measures for both ESL and EFL learners of English led to the identification of the relative importance of a language feature in the target language for reading (Pasquarella et al., 2011). Compound morphology plays a relatively minor role in English and so has little impact on reading measures, while is a very salient feature of Chinese. Therefore, measures of transferred compound knowledge should theoretically only predict Chinese reading (e.g. Wang et al., 2006; Pasquarella et al., 2011; Tong et al., 2018). However, later studies showing Chinese compound awareness predicting English reading outcomes in comparable contexts to the aforementioned studies need explaining (D. Zhang & Koda, 2013; Lin et al., 2018). One possibility, suggested by D. Zhang and Koda (2013), is

that Chinese compound awareness builds word analysis skills comparable to derivational awareness in English. If that were the case, we might expect to find strong correlations between measures of Chinese compounds and English derivations, but this has not been consistently been the case (compare Wang et al., 2006; Pasquarella et al., 2011; D. Zhang, 2013).

Saiegh-Haddad and Geva (2008) present two explanations regarding the relative importance of phonological and morphological awareness in the language of reading. The first – the orthographic transparency hypothesis – is that phonological processes will be more important in reading orthographically shallow languages. In orthographically shallow languages such as Spanish, readers can rely on the strong letter-phoneme correspondence and so there is little need for morphological processing. In English, however, an orthographically deep language, while the relationship between orthography and pronunciation may be irregular, a general consistent spelling of morphemes is maintained. Therefore, morphological awareness should be more useful for reading in English. The second – the morphological transparency hypothesis – is that morphological processes will be used more in reading morphologically transparent languages. In other words, when derived or inflected morphemes have an unambiguous syntactic role (the same affix does not have multiple functions), it will be more likely to be used as a clue for reading over phonological awareness.

The orthographic transparency hypothesis is supported by the researchers' findings that phonological awareness and oral language proficiency were the only predictors of word reading in voweled Arabic, compared to both phonological and morphological awareness explaining unique variance in English word reading. Results from Wang et al. (2009) also appear to support this, with English phonological awareness being a stronger predictor of unique variance in transparent Hangul word reading and Korean derivational morphology predicting opaque English word reading over morphological awareness. However, the same conclusion has not found where phonological awareness is only measured in one language (e.g. Ramírez et al., 2010), suggesting that global measures of phonological awareness may not be sensitive enough to measure this effect.

While the above hypotheses focus primarily on the language of reading measures, others point to morphological characteristics the source language of transfer. The idea that learners are more likely to draw from languages which are morphologically rich, whether transparent or opaque, is an attractive and logical hypothesis: morphological complexity may provide a larger toolbox of tacit morphological knowledge to draw on in another language. Different versions of this hypothesis have been put forward: while Besse et al.

(2019) suggest that the interactions between morphological richness and its importance for reading in the L1 will determine the extent of language transfer, Ramírez et al. (2010) claim that transfer will be observed transferring from more complex to simpler morphological systems.

An observation by Saiegh-Haddad and Geva (2008) points towards another possible explanation, although one which may be difficult to empirically prove. The authors note that non-linear Arabic morphological awareness requires the disentangling of two morphological units encoding orthographic and phonological information, entailing the simultaneous coordination of phonological, lexical, orthographic and syntactic skills. Measures of Arabic morphological awareness may therefore be better at differentiating between the skills needed for reading in an orthographically deep language such as English in a way that other languages may not. If this idea is correct, the direction of crosslinguistic influence would therefore be determined by the extent to which the component skills required for morphological processing in one language reflect the skills required for reading in another. In other words, what determines the directionality of transfer is not a specific characteristic of either language but the degree of complementarity between the two.

Nevertheless, while explanations based on characteristics of the known languages of the participants may provide valuable insight into what elements of language transfer and why, studies finding one-way contributions of morphological awareness to reading in opposite directions (compare Wang et al., 2006; Pasquarella et al., 2011; Tong et al., 2018 and D. Zhang & Koda, 2013; Lin et al., 2018) demonstrate that linguistic explanations are not sufficient in themselves.

The Role of Language Proficiency

Beginners

Many studies on the crosslinguistic role of morphological awareness in reading have sought to explain their results in terms of L1-L2 characteristics, but second language reading research has demonstrated that L1 differences diminish with increased proficiency and exposure to the target language (Koda, 2008; Grabe, 2009). It may be therefore be the case that the relationship between morphological awareness in one language and reading in another develops as a reader's language proficiency improves. While few studies have been conducted to date with absolute beginners or more advanced learners, some evidence of developmental changes in contributions of morphological awareness to reading can nevertheless be identified.

Floor effects found in studies including beginner L2 learners indicate that a certain amount of knowledge and exposure is necessary before L2 readers are able to draw on morphological awareness across languages (Deacon et al., 2007; Besse et al., 2019). Furthermore, beginner learners encounter few morphologically complex words in the elementary stages of second language instruction, especially derivations, meaning they have little knowledge of affixes and word formation rules. Instruments designed to measure elementary reading level often also contain fewer morphologically complex words making them less sensitive to learner differences at this stage (D. Zhang, 2013). A threshold effect found at elementary levels may also occur when mastery of a new script is required, as a certain level of grapho-phonological decoding skill may be required before the learner can draw on morphological knowledge (Besse et al., 2019). Furthermore, learning aides such as the use of diacritics to mark vowels for learners of Arabic or Hebrew may result in learners preferring to rely on phonological information over morphology at first (Saiegh-Haddad & Geva, 2008).

Evidence of L1 morphological transfer to L2 reading in the first year of foreign language learning in languages which are not typologically close has been found in two studies (Kahn-Horwitz et al., 2005; E. Cho & Tong, 2014), and in each case there are explanatory factors which may shed light on other influences affecting morphological transfer. In Kahn-Horwitz et al. (2005) the participants start learning English in Grade 4, later than in most comparable studies – in which foreign language classes start either in kindergarten, or Grade 1 or 2 – and L2 literacy is taught using direct grapheme-phoneme instruction, which could result in increased learner sensitivity to the internal word structure. Furthermore, the participants are reported to have regular extramural exposure to English. Greater cognitive maturity, more developed L1 literacy skills, instructional effects and enhanced exposure to the target language may all therefore have allowed these learners to draw on their L1 morphology when reading in their L2. In the second case, Korean derivational morphology was found to predict 6% of unique variance in first year L3 Chinese reading comprehension for Korean high school and university students (E. Cho & Tong, 2014). However, the researchers explain that more than half of Korean vocabulary is derived from classical Chinese characters and students receive traditional Chinese characters instruction before learning it as a foreign language. This would likely have aided the participants in identifying connections between the two languages, a conclusion supported by observation that the predictive power of L1 Korean derivational morphology was much more uniform between readers in L3 Chinese compared to L2 English.

More advanced learners

Two recent studies involving more proficient learners compared lower and higher performing participants in order to investigate whether the role of morphological awareness differs as a function of reading or proficiency measures. Koda and Miller (2018) investigated the influence of various skills on L2 lexical inferencing for Japanese university students with an average of 8 years of instruction. As part of their analysis, the researchers split the group according to higher and lower L2 linguistic knowledge (operationalized as grammar knowledge plus vocabulary breadth). Their results showed that lower L2 knowledge might prevent readers from drawing on L1 reading experience in L2 lexical inferencing: for learners with higher English proficiency, L2 morphological awareness was found to mediate relations between L1 literacy and L2 word meaning inferencing on the one hand, and L2 linguistic knowledge and L2 word meaning inferencing on the other. The researchers' use of high-frequency affixes in all tests and a decomposition task (see Appendix for description) as a measure of morphological awareness may suggest that sensitivity to morphological structure at higher reading levels is not enough for successful lexical inferencing: readers need enough L2 linguistic knowledge to be able to draw on L1 reading skills to infer word meaning from syntactic and contextual clues. This would explain a negative effect of morphological awareness found for the group with lower L2 linguistic knowledge: their inability to identify contextual clues in the text meant that an over-reliance on morphological information negatively affected their word inferencing ability (see also Hamada, 2014). Cho and Tong (2014) split their participants – Grade 9 Korean high school and university students who had been studying English since Grade 3 – into higher and lower performing groups according to English reading comprehension scores and found that the predictive power of morphological awareness was only significant for the more advanced readers. Analyses showed that English vocabulary and morphology contributed equally to reading outcomes for the better performing readers, while weaker readers relied more heavily on L2 vocabulary knowledge.

Therefore, while the number of studies on more advanced learners is low, evidence demonstrates that the between-language role of morphological awareness in reading is not confined to beginners. However, it may be the case that as texts become more advanced and learners use more sophisticated higher-level processing skills, the role of morphology in mediating L1 and L2 knowledge becomes increasingly complex: low L2 morphological awareness may inhibit readers from noticing comparable forms in their L1 which would strengthen language knowledge and aid reading outcomes (see Nagy et al., 1993; Ramírez et al., 2013). At the same time, low grammar and vocabulary knowledge may result in readers'

overreliance on morphological clues – or using L1 lexical inferencing skills which are not applicable to the L2 – to interpret unknown words, which can negatively impact reading outcomes.

Longitudinal studies

The relative importance of different predictors of L2 reading outcomes develop as reading improves (Nassaji, 2003; Schoonen et al., 1998; Alderson et al., 2016), so we might also expect to see a changing crosslinguistic role for morphological awareness in longitudinal reading studies.

In her longitudinal study of L1 Arabic learners of L2 French, Besse et al. (2019) observed a developmental shift where significant between-language correlations gave way to within-language correlations between second and third year. As a consequence, the impact of Arabic morphological awareness on French word reading fluency only appears in the third year of study, as covariance with French morphological awareness in the early years may have wiped out its unique contribution. The researcher suggests that at the early stages of L2 reading children use the same strategies in L1 and L2 – drawing on the cognitive abilities and knowledge developed in L1 literacy as far as possible – and L2-specific knowledge and processing become more important as second language literacy develops.

A longitudinal study on L1 English children in French immersion education by Deacon et al. (2007) found no crosslinguistic role for French inflectional awareness in the first grade, but in Grades 2 and 3 it explained 5% and 6% of English word reading respectively. In contrast, English morphological contribution to French word reading was 6% and 9% in Grades 1 and 2 but non-significant in Grade 3. One interpretation put forward by the authors is that the appearance of French morphological awareness as a predictor of both French and English reading measures in Grade 2 is related to rising L2 proficiency and may represent a point in development where participants have received more formal literacy experience in their second language. As a consequence, they draw more on French morphological awareness when reading in both languages.

A different relationship is observed in studies which have found crosslinguistic contributions of derivational awareness to word reading and reading comprehension for Spanish-speaking English language learners in both Grade 4 and Grade 7: these learners continue to draw on links between morphology even at a relatively advanced level of L2 proficiency and after much exposure to the L2 (Ramírez et al., 2010, 2013). Similar results were found by D. Zhang et al. (2016) in their study on L1 Malay students in English-medium education in Singapore, in which the strength of L2 derivation awareness' indirect

contribution to L1 lexical inferencing increased over the course of a year. In addition, it was first mediated via L1 morphological awareness in Grade 3, and via both L1 morphological awareness and L2 lexical inferencing in Grade 4.

One explanation for the different findings may be the type of morphology measured: English inflectional morphology measured in Deacon et al. (2007) is acquired relatively quickly, and so ceiling effects may have limited its predictive power. In contrast, the predictive power of derivational morphology included in the other studies tends to remain stable or even increase (Kuo & Anderson, 2006). Nevertheless, despite the different types of morphology and outcome variables used, these studies indicate that crosslinguistic contribution of morphological awareness to reading does not remain stable over time. They do not, however, allow us to identify whether these changes result from developments in cognitive maturation, language exposure or L1 literacy skills.

L1 Language Knowledge and Literacy Skills

As we have already seen L2 reading is a fundamentally crosslinguistic activity, and so it is no surprise that first language literacy skills have been found to be consistent predictors of L2 reading development (Schoonen et al., 1998; van Gelderen, Schoonen, Stoel, de Glopper & Hulstijn, 2007; Alderson et al., 2016). Considering that a child's L1 literacy skills and morphological awareness develop rapidly (Ku & Anderson, 2003; Berninger et al., 2010), it is possible that crosslinguistic interactions between morphological awareness and reading outcomes may differ in nature or magnitude depending on the age of language learning onset. It is also possible that learners from different language backgrounds may not be able to equally draw on their L1 knowledge at the same age as a result of skill subsets developing at different speeds as a function of language and educational characteristics (e.g. Ellis et al., 2004; Geva & Siegel, 2000). While most research on this topic has been conducted in primary education, where the participants are still developing readers, it is notable that two studies which include learners who start foreign language learning at older ages are unique in finding L1 morphological awareness to contribute to L2 reading outcomes at such an early stage of development (Kahn-Horwitz et al., 2005; E. Cho & Tong, 2014). As noted earlier, greater knowledge of complex morphology in their own language may provide an advantage in analysing L2 morphology (Koda, 2008) and more developed cognition may allow L2 learners to better utilize their linguistic knowledge.

Findings of a negative effect of L2 English derivational awareness on L1 Chinese word reading for elementary school pupils (Choi et al., 2018) indicate that at early stages of

literacy development, children may inappropriately draw on L2 morphological awareness in L1 reading if their first language is not sufficiently developed: the authors suggest that these participants generalized English reading processes to Chinese, including analysing morphological structure in a larger grain size and applying English derivational rules to Chinese characters.

The importance of both L1 morphological awareness and L2 competencies suggests that we might also expect to see the crosslinguistic role of morphological awareness in reading differ between minority language students and foreign language learners. Firstly, minority language students in mainstream education often have less literacy instruction and exposure to texts in their first language, and so may be less developed in terms of L1 reading and morphological awareness. This may hinder their L2 progress as they do not have relevant L1 knowledge support (Durgunoğlu, 2002). Secondly, minority language speakers encounter their second language as a medium of content instruction rather than in a foreign language class. This can lead to rapid increases in the speed and accuracy in the processing of L2 morphology compared to learners in foreign language contexts (de Zeeuw, Schreuder & Verhoeven, 2013) and help to overcome morphological processing problems originating in linguistic distance (Kieffer & Leseaux, 2012b). Educational programmes vary widely in how they treat minority language speakers' first language (Cook, 2010), and so the linguistic development of minority language will not only differ to that of foreign language learners but will also likely vary widely from one context to another.

Nevertheless, at present it is difficult to identify differences in the crosslinguistic role of morphology in literacy in studies between minority language and L2 learners due to the small number of studies with comparable populations. The only group where comparisons may be drawn between multiple studies of the same language combination of languages – Chinese-speaking learners of English – shows broadly similar results for learners for both foreign and second language students. While studies on bilinguals Chinese-English children in English-speaking countries have found more and different direct and indirect crosslinguistic contributions of morphology in reading (Wang et al., 2006; Pasquarella et al., 2011), recent studies on L1 Chinese EFL students have observed both direct effects of English compound awareness on Chinese word reading (Tong et al., 2018) and indirect effects of Chinese compound awareness on English word reading via English compound awareness and Chinese lexical inferencing (Lin et al., 2018).

Choice of Reading Measures and Morphological Awareness Task Design

Morphological awareness has a differential effect on the dependent variables used in reading studies – reading comprehension, word reading accuracy, word reading fluency and lexical inferencing – due to the cognitive demands for each are different. Word reading accuracy is the most common literacy measure used by researchers and positive crosslinguistic contributions have been found in many studies (Kahn-Horwitz et al., 2005; Deacon et al., 2007; Saiegh-Haddad & Geva, 2008; Wang et al., 2009; Ramírez et al., 2010; Lin et al, 2018; Tong et al., 2018). A small number of studies (Saiegh-Haddad & Geva, 2008; Besse et al., 2019) have used measures of word reading fluency, a measure linked to automaticity of decoding (Jenkins, Fuchs, van den Broek, Espin & Deno, 2003; Hudson, Lane & Pullen, 2005): Saiegh-Haddad and Geva (2008) included both measures of fluency and accuracy and found different predictor variables for each: participants drew more on L2 morphological awareness for L1 word reading fluency, while both L2 phonological and morphological awareness contributed to L1 reading accuracy.

Theoretically, morphological awareness might be expected to be less important for reading comprehension due to the task's increased complexity: reading comprehension involves the integration of lower-level processing of letters, syllables and words with higher-level integration of word-level information into sentence and passage-level meaning typically predicted by domain-general comprehension skills (Language and Reading Research Consortium, 2015; Kim, 2015). However, results from studies which include both measures are difficult to interpret. Wang et al. (2009) found that English morphological awareness contributed to Korean word reading but not reading comprehension, and suggested that the differences stem from language distance effects: Korean and English share derivational morphology features yet differ widely in syntactic features. However, this explanation cannot account for inverse results found for languages with similarly divergent syntactic properties: crosslinguistic contributions of morphological awareness to reading comprehension but not word reading were observed in studies of bilingual Chinese-English children (Pasquarella et al., 2011) and L1 Hebrew EFL learners (Kahn-Horwitz et al., 2005).

Task design issues may be one explanation of these seemingly contradictory results. In the first study, which reports contributions of Korean morphological awareness to English word reading accuracy, over a third of the items in the word reading task were morphological complex words, the vast majority of which being derivations. In contrast, the English word reading latency test from Kahn-Horwitz et al. (2005) did not include any derived or inflected words, and consequently was not found to correlate with the

morphological awareness measures. Furthermore, the two studies which found no contribution of morphological awareness to word reading accuracy both used word reading tasks which proceeded from simple to complex or frequent to infrequent words, and stopped after a defined number of consecutive errors. In both cases, low mean scores and high standard deviations indicate that many participants may have responded to few or no morphologically complex words in these measures too.

Studies finding crosslinguistic contributions of morphological awareness to reading comprehension find that direct and indirect transfer of morphological awareness occurs almost exclusively from the language in which the child has stronger literacy skills to the weaker one (Kahn-Horwitz et al., 2005; Wang et al., 2006; Pasquarella et al., 2011; Ramírez et al., 2013; E. Cho & Tong, 2014; Choi, 2015). A single exception is a study by Lin et al. (2018) which may be explained by the choice of morphological awareness task: a relational judgement task (see Appendix for description) measuring knowledge of semantic rather than formal properties of polysemes. A tentative implication might be that, at an early stage of reading when word decoding is the primary predictor of reading comprehension and in typologically distant languages, individual differences in sensitivity to morphological structure in the stronger reading language predict reading outcomes in the weaker language. On the other hand, as stronger readers are expected to have more automatized word decoding skills, contributions from morphological awareness in a weaker language to reading comprehension in a stronger language may only be observed if the instrument draws on semantic information encoded in morphemes rather than structural features.

All in all, current evidence demonstrates that the crosslinguistic role of morphological awareness in reading varies to a certain degree in function of the differential cognitive demands of word reading accuracy, word reading fluency, lexical inferencing and reading comprehension tasks. The design of the literacy measure is also key: if no morphologically complex words are included it seems extremely unlikely that a relationship will be detected. Furthermore, evidence that different morphological awareness tasks may tap into different types of morphological knowledge or processes appears to back up confirmatory factor analysis studies representing multidimensional model of morphological awareness (Tighe & Schatschneider, 2015, 2016; Bourdages & Foucambert, 2018). Choices of task and language included in both dependent and independent variables are therefore central factors in study outcomes.

6. Concluding Remarks

Summary

This paper presents a review of the literature on the crosslinguistic role of morphological awareness as a psychological construct on measures of literacy, highlighting both within- and between-language interactions and factors which have been identified as influencing these outcomes. The picture that emerges from the literature is consistent with current research on literacy development and learning acquisition. Individuals draw on their morphological knowledge and processes during reading, and the importance of morphological awareness relative to other reading skills varies according to task demands and language features. This is often facilitative, but erroneous generalisations from one language to another do sometimes occur. Age, individual differences in cognitive abilities, language knowledge and literary experience in both languages appear to affect the strength and nature crosslinguistic interaction. However, methodological inconsistency and unresolved theoretical questions mean that, at present, current research cannot provide decisive evidence for evaluating the competing hypotheses on the relative importance of the identified intervening factors.

Limitations

This state-of-the-art review has several limitations. Firstly, while every attempt was made to include all relevant research, the question of delimiting the scope of this article is to a certain extent determined by personal judgements on which the most important findings of research on the topic are. Secondly, it was beyond the scope of this thesis to systematically draw comparisons with other related areas of research, such as morphological processing or the crosslinguistic influence of other reading skills, which may have provided insight into the results of the included studies. Thirdly, as research into morphological awareness transfer in reading is at an early stage, the studies included here have different aims and diverse research designs. This review could only provide a very limited evaluation of the choice of instruments and control variables chosen by researchers in this study, and so the discussion of results places greater emphasis on reports of statistical significance rather than a more detailed discussion of study designs.

Future Directions in Morphological Awareness Research

Investigation of crosslinguistic role of morphological awareness in reading is still a developing field and consequently there are multiple avenues for future research which may be fruitful. As with many other areas of applied linguistics, the literature is dominated by studies including speakers of English and would undoubtedly be enriched by investigation into bilinguals who speak different language combinations, especially when investigating language-related variables hypothesised to affect the direction of transfer. In addition, the crosslinguistic role of morphological awareness in reading in speakers of more than two languages has been left largely unexamined (E. Cho & Tong, 2014, being an exception).

The syntactic aspect of morphological awareness is an underexplored area in the literature. Syntactic information encoded in morphology has been identified to be important for reading comprehension (Nagy et al, 2014) and affect the strength of morphological awareness transfer (Wang et al, 2009), and so separate measures of syntactic awareness should be incorporated in future studies to test this hypothesis. In addition, the use of separate measures of relational, syntactic and distributional morphological knowledge may help identify which types of knowledge bilinguals utilise while reading and to test how different linguistic information encoded in morphology transfers differently according to typological proximity. Furthermore, various factors which have been shown to influence crosslinguistic influence in other language domains, such as frequency and recency effects, salience, attention, and instructional effects, are logical factors to explore (Jarvis & Pavlenko, 2007).

Theoretical and methodological questions remain at the heart of many of the unresolved questions in the literature, and so future research should increasingly aim to test hypotheses used to explain previous results. Definitions of morphological awareness encompass both implicit and explicit morphological knowledge and processing, and instruments and task instructions vary in the degree to which they demand explicit reflection when answering (Berthiaume et al, 2010, 2018; see also Nagy et al, 2014). However, at present this distinction has been left largely unexplored in L2 studies. In addition to interpreting findings through relevant research on morphological processing and reading strategies, future research should be looking to identify what exactly it is that morphological awareness tasks measure that contributes to reading outcomes in another language – tacit morphological knowledge, cognitive processes, overt inferencing strategies, strategy use or otherwise – in order to resolve questions raised in the literature.

In order to test hypotheses, researchers should incorporate more between-group comparisons in their studies. A good example of this was the splitting of participants according to reading scores in E. Cho and Tong's (2014) paper, which revealed that L1 morphological awareness only explained unique variance for the stronger students' reading performance. As research to date features a wide range of learners, contexts and study designs, identification of where differences originate like this is particularly valuable. In research on L1 reading problems and disabilities, it is common to compare groups matched by reading level to ensure that differences in morphological awareness cannot be causally explained by reading ability or exposure to print (Deacon et al., 2008). Similar comparisons of groups matched according to relevant measures may also be a beneficial way of investigating crosslinguistic relationships between morphological awareness and other predictors of reading.

Finally, one of the problems complicating comparisons of research conclusions is the crosslinguistic nature of this research area. Most studies included in this paper use researcher-designed experimental measures of morphological awareness and reading in order to accommodate participants' language skills and control for confounds such as cognate status, phonologic shifts, frequency and familiarity effects. However, this has resulted in a vast number of instruments being used, many of which are not made available to the reader, making the comparison of results difficult. Meanwhile, standardized, norm-referenced or curriculum-based reading measures are often unsuitable due to lack of morphologically complex words or the existence of potential confounds. Future research on this topic should clearly justify the choice of instruments and target language and make both morphological awareness and reading comprehension instruments available to readers.

10,423 words.

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Appendix: Tasks Used to Measure Morphological Awareness in Literacy Research

The first ten tasks were classified by Berthiaume, Besse and Daigle (2010) according to their cognitive demands while the final two were identified during this literature review. The design of these tasks vary considerably in the literature according to the study aims and participant characteristics (see p. 5). Note that these tasks do not consistently have the same name in the cited studies.

Task type	Description
1. Derivation task	Participants must produce a derived form of a root word to complete a sentence: *Farm. My uncle is a _____ (farmer)* (Carlisle, 2000). This task has been identified as testing participants' awareness of morphological structure (Wang et al., 2006), ability to identify the syntactic category of the target word and derive its correct form (Koda et al, 1998; Jeon, 2011; Marinova-Todd, Siegel & Mazabel, 2013).
2. Decomposition (segmentation) task	Participants must extract the base morpheme from a morphologically complex word: *Density. The smoke in this room is very _____ (dense)*. (Wang et al., 2009). This task has been identified as evaluating participants' relational knowledge (Choi, 2015), and their ability to combine lexical knowledge and morphological analysis (Kieffer & Lesaux, 2008).
3. Reading aloud task	Participants must read aloud a series of morphologically complex words which vary in terms of root morpheme and affix frequency. This task has been identified as testing the influence of frequency effects (affix frequency, root morpheme frequency, word family size, average frequency of word family size) on morphological knowledge (Carlisle & Katz, 2006).

4. Relational judgement task	Participants must identify whether two words are morphologically related or not: *Think, thinker; too, tooth* (D. Zhang et al., 2016). This task has been identified as testing participants sensitivity to relational morphology knowledge (Ku & Anderson, 2003; Kuo & Anderson, 2006), as well as semantic and phonological (Carlisle, 1993) or syntactic (Besse et al., 2015) information encoded in morphemes.
5. Definition task	Participants must produce a morphologically complex word which fits a provided definition: *Which is a better name for a bee that lives in the grass: a grass bee or a bee grass?* (Wang et al, 2006). This task has been identified as testing participants' syntactic knowledge (Kuo & Anderson, 2006): familiarity with word formation rules (Lin et al., 2018) and the ability to create new meanings by making use of familiar morphemes (Berko, 1958; McBride-Chang et al., 2005).
6. Identification of morpheme meaning task	Participants must choose which best image represents a target word from a series of pictures representing words which share either root morphemes or affixes. This task has been described as evaluating participants' ability to recognise the meaning of component morphemes of a word (Hu & Schuele, 2015).

7. Affix choice task	Participants must choose which morphologically complex word best fits the sentence: *She hoped to make a good* _____. *A. impressive* *B. impressionable* *C. impression* *D. impressively* (Singson et al., 2000). This task has been identified as testing participant knowledge of the syntactic properties of affixes (Tyler & Nagy, 1989).
8. Odd-one-out task	Participants must identify a pseudo-morpheme – a word part which shares the form of other morphemes in other provided words but does not carry any meaning in itself – from a given list: *A. classroom,* *B. bedroom,* *C. mushroom*. (Ku & Anderson, 2003) This has been classified as testing participants' ability to analyse the internal structure of words (Besse et al., 2015) or differentiate meanings of morphemes (Lin et al., 2018).
9. Word analogy task	Participants must use information provided in affixes to identify a grammatical relationship comparable to the given example: *Danger is to dangerous as delight is to* _____. *A. delightful* *B. delightfully* *C. delightful* *D. delight*. (Koda et al., 1998). This task has been described as a test of relational knowledge (Koda et al, 1998).

10. Plausibility judgement task	Participants must judge whether a series of presented pseudoword follow word-formation rules or not: *Chewer; purposehood; pourable; alertility; forestify* (Tyler & Nagy, 1989). This task has been identified as testing participants distributional awareness (Tyler & Nagy, 1989; Koda et al., 1998; Kuo & Anderson, 2006)
11. Fluency task	Participants must identify as many suffixes as they can which can be added to a root morpheme: *Agree: -able, -age, -al, -ance/ence, -ed, -ee, -er/or, -eing, -ion, -ly, -ment, -s, -ure* (Jeon, 2011). This task, an evaluation of distributional knowledge (Choi, 2015), has been classified as a test of participants' vocabulary depth (Schmitt & Meara, 1997) and ability to identify the constituent morphemes of a word (Jeon, 2011).
12. Homophone compound task	Participants must write two multi-syllable words using a target morpheme: one including the same morpheme, the other including a morpheme spelled and pronounced the same but with a different meaning. This task has been identified has testing participants ability to differentiate between morphemes with identical spelling and pronunciation (Shu, McBride-Chang, Wu & Liu, 2006; Cho et al., 2011)