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Review

Transfer of L1 Phonological and Orthographic Awareness in L2 Reading

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【Abstract】

Transfer of some L1 reading skills and knowledge to L2 reading is uncontroversial and expected. Understanding how and how much lower-level skills such as phonological awareness and orthographic awareness transfer and what mediating factors affect this transfer are important in designing instruction and interventions. This paper explores the theoretical underpinnings of transfer and research done on the role of these types of processing in second language reading, with a particular focus on learners whose language does not use the Roman alphabet, but instead makes use of logographic characters. While there are well-established correlations between the first and subsequent languages for phonological awareness, orthographic awareness seems to emerge mainly from interaction with the new language. The pedagogical implications of this are discussed.

Key words: Reading, Transfer, Phonological awareness, Orthographic awareness

総　説

第 2 言語リーディングにおける第 1 言語音韻・正字認識能力の転移

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【要　旨】

第 1 言語の読解技能や知識が第 2 言語のそれに転移することについては議論の余地がなく想定されている。一方、より低次の技能である音韻および正字認識能力がいかに、またどの程度転移し、どのような媒介要因がその転移に影響するかについて理解することは、指導や教育的介入にとり重要といえる。本稿は、第 2 言語リーディングにおける転移やこうした種類の言語処理の役割に関する研究における理論的基盤について、ローマ字ではなく表語文字を用いる学習者に焦点を当てて考察する。音韻認識能力については第 1 言語と第 2 言語以降の言語の間に十分に認知された相関関係があるが、正字認識能力については主に新たな学習言語との接触を通して発達するようであり、こうした点についての教育的示唆にも言及する。

キーワード：リーディング、転移、音韻認識、正字認識

1. Introduction

Transfer in education is the application of prior learning to new contexts. In language learning, a number of questions exist regarding whether and to what degree, first language (L1) knowledge and skills can be used with a second language (L2). This is an important issue to understand in foreign language reading because it can help to determine where to put pedagogic focus in programs and interventions. The large number of potentially

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mitigating factors make transfer difficult to understand, however. In educational psychology, transfer is believed to be facilitated by similarity. That is, it tends to happen only when the originally developed skill or knowledge is analogous to the skill or knowledge requirement of the new task (Kirschner & Hendrick, 2020). Little to no transfer has been found to occur when domains are different, and it seems that there is often a failure for transfer to occur even when domains are similar (Anderson, 2015).

This paper will examine the literature on transfer of knowledge and skills obtained in L1 reading to reading in a subsequent language. The idea is that when academic knowledge and skills are acquired in an L1, there is an accompanying learning of information about those skills, which is automatically activated when triggered by L2 input (Koda, 2007). This information can facilitate reading or learning to read in that subsequent language (Goodrich & Lonigan, 2017). Reading comprises various skills, knowledge and strategies, too many to look at in one paper. This paper will limit its examination to transfer with reading-related phonological processing (phonological awareness, phonological working memory, and phonological recoding) and orthographic processing in English, particularly by learners whose L1 is a non-alphabetic language with a different script than English. The importance of phonological skills is well-recognized in L1 English reading pedagogy (Castles et al., 2018; Dahaene, 2009; Kilpatrick, 2015; Seidenberg, 2017). This paper will focus on how cross-linguistic phonological transfer might affect decoding and word recognition in the L2, small but important parts of the process of achieving comprehension. In EFL contexts, where learners typically begin learning an L2 after already having achieved significant proficiency in their L1, some transfer is always assumed. The timing and characteristics of L2 reading acquisition make it a different challenge from L1 reading acquisition, but the question is one of degree, as the basic orthographic-phonological and semantic processes that operate in word reading are actually remarkably similar across languages (Dahaene, 2009; Koda & Zehler, 2008).

According to Grabe and Stoller (2019), "…the L2 reader learns to read in the L2 with a two-language system...the L1 never completely turns off" (pg. 38). Determining the extent to which transfer does or does not happen with phonological processing can help to decide how much training learners need for sufficient development with L2 reading. This is, however, a difficult proposition given the many variables at play: L1 and L2 language feature similarities; age of onset of L2 instruction; L2 proficiency and extent of exposure; and quality of instruction, among others (Geva et al., 2019). In the EFL context of Japan, less classroom time is allotted for phonological training (compared to L1 reading pedagogy), little space is devoted to it in textbooks, and teachers receive less training in how to conduct it (Carley, 2018). L1 reading intervention studies have shown the benefits of phonemic awareness training and remedial phonics instruction (Kilpatrick, 2015; Kilpatrick & O'Brien, 2019). Should these receive more attention in L2 reading pedagogy, particularly for learners who are not performing to expectations?

2. The Elements of Reading

2.1. The Skills Involved in Reading

Reading is the process by which meaning is derived from encoded print. That involves making use of a variety of skills and knowledge to recover and construct meaning from print and its context (Castles et al., 2018). To get the meaning of the text, the reader must first identify the individual words. This includes recognizing the letters and ascribing sounds to them, a step known as decoding. This involves both phonological processing (see below) and orthographic processing using the visual

orthographic information in the word (Yamashita, 2018). At the same time, the reader activates the meaning of the words, appropriate for the context. For this, the reader relies on morphological and grammatical information in the word and information about what's around the specific text as well as stored memory knowledge about the word. In tandem with this, the reader is accessing background information about the topic and the language features, trying to build connections with other parts of the reading material, making inferences and testing them out. This cognitively laborious process places a lot of demands on working memory and executive function, particularly when gaps and inconsistences arise in comprehension (Castles et al., 2018). Because of the complexity of the process of reading, fluency or automaticity with any of the parts greatly facilitates successful comprehension by freeing up cognitive resources (Nassaji, 2014). Instantaneous decoding and word recognition are thus essential for good readers (Grabe & Stoller, 2019).

2.2. The Simple View of Reading

The Simple View of Reading is an influential way of looking at reading that was proposed by Gough and Tunmer (1986). They sought to reduce the complexity of reading to two essential interdependent processes in a simple formula: Reading Comprehension = Decoding × Listening Comprehension. This formula has both great explaining power and great practical application, and has been found to hold true for L2 readers as well, at least for alphabetic languages (Verhoeven & van Leeuwe, 2009). From it, we can see that if either decoding skills or listening comprehension skills are insufficient, reading comprehension will be disrupted. Using it, teachers can focus their diagnostic testing on just decoding skills and listening comprehension to obtain data on student performance that explain 40-80% of variance in reading comprehension (Joshi, 2019). In recent years, researchers have added psychological and ecological factors to this model that increase its explaining power, though the emphasis on decoding/word recognition and listening comprehension remains (Joshi, 2019; Willingham, 2017).

It is also common to hear the two processes described as lower-level, basic skills and higher-level skills, with phonological awareness, word/sight recognition, decoding, and rapid automatized naming included in the former, and background knowledge, inferencing, vocabulary knowledge, grammatical knowledge, and metacognitive strategies grouped in the latter (Geva et al., 2019; Scarborough, 2001). The grouping of skills into lower- and higher-level sets is helpful for EFL reading pedagogy. Listening comprehension, a complex construct, is not always a clear indication of an L2 learner's knowledge of language or ability to comprehend language (Rost, 2015) even though there is evidence that the effect of language knowledge in that part of the equation may be greater for L2 readers (Cho et al., 2019). What is important about the formula, however, is the crucial role it gives to decoding and the associated sub-skills. Word reading is "fundamental" to both L1 and L2 reading, and accurate and automatic word recognition is a major predictor of reading comprehension for L2 readers (Grant, Gottardo & Geva 2011; Nassaji, 2014; Verhoeven & van Leeuwe, 2009)

2.3. Reading-related Phonological Processes

Because the focus of this examination is particularly transfer of the decoding/word recognition/lower-level skills, specifically reading-related phonological processes, a detailed explanation of this set of processes is warranted. The set includes phonological awareness, phonological working memory, and phonological retrieval, closely related and perhaps interdependent processes (Wagner et

al., 2019). Phonological awareness is knowledge of and access of the sound structure of an oral language, how words are pronounced and how sounds are represented (Wagner et al., 2019). Along with orthographic awareness, this skill appears to be crucial for quick and efficient word recognition that in turn allows the reader to free up cognitive resources that can be used for comprehension strategies (Kilpatrick & O'Brien, 2019; Miles & Ehri, 2019). It has been found to play an important role in reading (decoding), not only in alphabetic languages, but also in non-alphabetic languages (Nassaji, 2014). Principally this involves detecting and manipulating phonemes, the basic sounds of the language. Yet phonological awareness is itself a collection of different types of awareness, comprising word awareness, syllable awareness, onset-rime awareness, and phonemic awareness.

Languages are classified in terms of how consistently their writing systems match their phonemes. For the writing systems of alphabetic languages, the sounds of the phonemes correspond to the letters and permissible combinations of letters in the alphabet. English has great orthographic depth. It features substantial spelling irregularities between phonemes and graphemes, and a high number of phonemes and grapheme-to-phoneme possibilities, making it one of the most challenging languages in the world to learn to read (Marjou, 2019). English and French are known as morphophonemic orthographies because although the spellings represent phonemes, the large number of spelling inconsistencies reflect morphemes that carry meaning differences (Seymour, Aro, & Erskine, 2003). Becoming proficient in reading in English, either as a first or second language, generally requires more time (Goswami, 2005; Perfetti & Dunlap, 2008).

Strong phonological awareness, and in particular the sub-skill phonemic awareness, has been shown to be the best predictor of reading success (Melby-Lervåg, et al., 2012), with learners typically building awareness and skill in an established developmental order, from larger units such as compound nouns, to syllables, to onsets, to rimes, to individual phonemes, and lastly to phonemes within clusters (Crowder & Wagner, 1991). Students learning to read in English as an L2 need to master the challenge of both perceiving and producing a new range of sounds and matching them to letters, a challenge which appears greater if that learner's L1 has fewer phonemes or is more orthographically shallow (Bunce, 2020). As they gain familiarity and automaticity with words, they are added to a reader's collection of instantaneously recognizable sight words (Miles & Ehri, 2019), and thereafter orthographic visual processing becomes more prominent (Cunningham et al., 2011).

The second phonological skill in the set is phonological memory, the ability to temporarily store sound-based information for about 2 seconds, sometimes called the phonological loop (Baddeley, 1996). This ability appears to be important when a learner attempts to sound out newly encountered words, add new words to their vocabulary, or comprehend longer strings of text (Wagner, et al., 2019). Of these, the first two are particularly pertinent. Share (1995) found that sound memory was crucial for encoding and thus building the large repertoire of sight words needed for fluent independent reading. When learners encounter unknown words, they engage in a process of storing written words for later recall by their pronunciation. This process, called orthographic mapping, helps emergent readers to read words accurately and then build automaticity with them (Miles & Ehri, 2019).

The final phonological skill in the set is phonological recoding, or accessing pronunciation and meaning (Wagner, et al., 2019). This skill is usually assessed with rapid automatized naming

(RAN) tasks which measure how well items are known, how well the pronunciation is known, and how automatic the connection between them is. RAN ability is predicated on the notion that the efficiency of retrieval of meaning and pronunciation shows how well phonological information can be used when reading words. It has been shown to be a strong predictor of reading skills (Landerl, et al., 2019)

3. Transfer in Reading

3.1. Theoretical Framework for Transfer of Academic Reading Skills

As mentioned earlier, transfer is a complex phenomenon that is greatly influenced by a number of factors. Historically, two complementary frameworks have been used to explain the notion of transfer (Geva et al., 2019): Lado's (1957) contrastive hypothesis and Cummins's (1981) linguistic interdependence hypothesis. Both emerged from research and experience in North America, where large communities of Spanish and French speaking students can be found in English classrooms. The former deals with contrastive language features and rhetoric in a very general way, while the latter looks at academic development within and across languages in an attempt to help children better integrate into new school environments. The contrastive hypothesis emphasizes the need to contrast the L1 and L2 to look for similarities and differences among the phonological, orthographic, and discourse language features. It postulates that similarities are likely to lead to positive transfer, while differences are likely to lead to negative transfer (interference or errors). This framework is useful for thinking about which specific features of the target L2 will likely be more challenging (Geva, et al., 2019). With the linguistic interdependence hypothesis, Cummins (1981) emphasized that there were common underlying proficiencies for all language skills. Positive transfer of (especially) higher-level skills and strategies to the L2 occur in cases where they were already developed in the L1. While the amount of transfer did depend on the skill and he recognized the more limited transfer of lower-order skills, he saw most skills and knowledge as being connected to underlying cognitive processes that form a base for all language learning. That transfer was often not automatic, he claimed, but depended on the quality of the original L1 instruction and the L2 language proficiency of the student. Motivation and the amount of language exposure were also crucial factors. He saw poor L1 skills as a critical reason many students were struggling in their new L2 settings. Subsequent research has added considerable support for the linguistic interdependence hypothesis (Genesee et al., 2006; Geva et al., 2019).

In more recent years, research has been conducted in a wider range of educational contexts with learners from a greater variety of languages, including non-alphabetical languages with different writing systems. These frameworks added greater detail to the existing frameworks. Among these, the underlying cognitive processes perspective (Geva & Ryan, 1993) proposes that basic universal underlying cognitive processes such as working memory, phonological awareness, RAN and executive functioning are innate and are activated when reading any language, even when the oral language proficiency in the L2 is still developing (Durgunoğlu, 2002; Geva et al., 2019). These cognitive processes are not easy to modify through training, with the exception of phonological awareness (Geva et al., 2019).

Although similar to the linguistic interdependence hypothesis, Koda's (2008) transfer facilitation model identifies metalinguistic awareness, the ability to identify and manipulate language forms, as the critical element for transfer. She claimed that learners with this awareness (if it is sufficiently established in the L1) automatically bring

phonological, morphological and orthographic processing to bear in the L2. Several studies have found that L1 and L2 reading are related, even when the orthographies are different (Lesaux & Siegel, 2003). There is evidence that certain general cognitive skills−working memory, phonological awareness, and RAN−underlie both L1 and L2 processing (Geva, Wade-Wolly, & Shany (1997). Exploring the extent of the linguistic interdependence hypothesis, Godrich and Lonigan (2017) looked at the phonological awareness, print knowledge, and oral language skills of language minority children in the United States (mostly Spanish speakers learning English). There is considerable, but not consistent, evidence that learning them in either language allows them to be applied in the other (Durgunoğlu, 2002; Godrich & Lonigan, 2017). They described how literacy-related skills form a continuum from language-independent (and thus more transferable) to language-dependent (less or not transferable, and requiring intensive work within a language to develop). Phonological awareness and print awareness seem to be more language-independent skills. They explain that print knowledge consists of language-independent knowledge, letters having names and associated sounds, but it also includes language-specific information, such as that specific letter combinations and letter-sound correspondences are possible or common. At the other end of the continuum, vocabulary and oral language skills were found to be more language-dependent and did not appear related to L1 abilities (Godrich & Lonigan, 2017).

These frameworks make it clear that some skills are indeed connected to underlying cognitive processes regardless of the language. Researchers applying these frameworks make use of three empirical perspectives (Hipfner-Boucher & Chen, 2016): L1-L2 performance comparisons; correlational studies that look at skill achievement in each language; and a focus on the transfer of metalinguistic and cognitive skills. Most research has involved alphabetic L1 learners learning an alphabetic L2 (Godrich & Lonigan, 2017).

3.2. The transfer of Phonological Awareness, Phonological Working Memory, and Phonological Retrieval to L2 reading

Language performance comparison studies have found that "overall, phonological awareness abilities are influenced by the phonological characteristics of the language to which children are exposed, including the language of instruction," along with the quantity of exposure (Hipfner-Boucher & Chen, 2016, pg. 105). Correlational studies have tended to find that there is a strong connection between phonological awareness skills in the L1 and the L2 (Hipfner-Boucher & Chen, 2016). And metalinguistic and cognitive skills transfer studies have shown that phonological awareness acquired in one language can facilitate word reading (but not reading comprehension) in the other (Hipfner-Boucher & Chen, 2016).

Recent studies have described the importance of phonological processing in explaining the variance of performance in L2 reading (Geva, et al., 2019; Jeon & Yamashita, 2014; Kormos, 2020; Kormos, Babuder, & Pižorn, 2019; Kormos, & Ratajczak, 2019). Assuming transfer of underlying processes, they looked for correlations of L1 phonological processing and L2 processing and reading comprehension. Jeon & Yamashita (2014) in a meta-analysis looked at the correlation average between L2 reading comprehension of passages and reading component variables arranged in two groups: high-evidence correlates (L2 decoding, L2 vocabulary knowledge, L2 grammar knowledge, and L1 reading comprehension); and low-evidence correlates (L2 phonological awareness, L2 orthographic knowledge, L2 morphological knowledge, L2 listening

comprehension, working memory, and metacognition. They also found that L2 grammar knowledge (r = .85) and vocabulary knowledge (r = .88) explained the largest part of the variance in learners, with decoding (r = .56) also among the top three high-evidence correlates. Phonological awareness (r = .48), orthographic knowledge (r = .51), and working memory (r = .42) played a less important role, although still significant. Curiously, L2 listening comprehension (r = .77) was more highly correlated with L2 reading comprehension than L1 reading comprehension was (r = .50). These findings led the researchers to conclude " …that L2 reading comprehension is essentially determined by L2 language ability" (pg. 189). Kormos, Babuder, and Pižorn, (2019) in research on Slovenian elementary school children learning English and Kormos and Ratajczak (2019) in research on Hungarian middle school students learning English found that roughly 15-25% of the variance in L2 reading ability differences could be explained by individual differences in the lower-level L1 skills of phonological awareness and timed word and non-word reading. While this pales in comparison to the 54% of variance explained by L2 vocabulary and grammar knowledge (Kormos, & Ratajczak, 2019), it is still a fairly significant amount. Kormos (2020) in summarizing the two studies, claimed that low-level skills (phonological awareness and phonological retrieval) may contribute indirectly to L2 comprehension by facilitating or hindering the smooth recognition of words, a role similar to what many researchers see them performing in the L1.

4. Different Orthographies

Phonological working memory and phonological retrieval seem to impact reading in an indirect manner. They are relatively stable, individual differences that do not change much with intervention (Geva, et al., 2019). For this last section, we instead focus on phonological and orthographical (print) awareness and decoding. For L2 reading, several questions need to be answered: whether phonological processing skills are as essential to L2 reading as L1 reading; whether and to what degree phonological processing skills in the L1 and L2 are related; and whether there is a mediating effect from types of languages and scripts and orthographic awareness (Nassaji, 2014). Research has shown that for L2 reading, phonological awareness skills are significantly related across languages (Melby-Lervåg, & Lervåg, 2011) and it can be called "a language-universal construct" (Hipfner-Boucher & Chen, 2016). Phonological and orthographic processes play an important role in L2 decoding and word recognition, which are connected to reading comprehension (Cho et al., 2019; Jeon & Yamashita, 2014; Ji & Baek, 2019). Word reading ability has been found to be an even better predictor of reading comprehension than listening comprehension with students who have reading comprehension problems (Vaughn, et al., (2019). When both the L1 and the L2 are alphabetic, phonological awareness transfers fairly consistently, so long as learners understand the concept of letter-sound pairing (Goodrich & Lonigan, 2017; Nassaji, 2014). Yet even when non-alphabetic logographic scripts (such as Chinese) or other scripts (Farsi and Korean) are involved, there is considerable evidence for phonological awareness transfer (Lesaux & Siegel, 2003). This has been found to hold true not only with alphabetic languages, where individual sounds are represented by particular alphabetic letters or letter combinations, but also with non-alphabetic languages (Nassaji, 2014). The exact mechanism remains unclear. Some evidence exists that L1 and L2 skills are only related, when the two languages used the same writing system (Bialystok, Luk, & Kwan, 2005) while other studies have found strong correlations for across languages with

different writing systems (McBride-Chang & Ho, 2005). Research on advanced EFL students in Japan has shown that L2 reading comprehension was strongly related to the accuracy and efficiency of their word recognition (Shiotsu, 2009), suggesting that qualitative skill differences in orthographic processing and phonological processing developed through training within the L2 language and script have a greater impact on L2 reading proficiency than transfer or even general L2 proficiency (Nassaji, 2014).

Orthographic processing appears to transfer dependably from the L1 only in cases where the L1 and L2 share the same Roman alphabet (Chung, Chen, & Geva, 2018; Hipfner-Boucher & Chen, 2016) and develop in the L2 from exposure and practice (Koda, 2005, Yamashita, 2018). It is not completely language-specific, but is highly constrained by the script(s) used in the L1 and L2 (Hipfner-Boucher & Chen, 2016). While it is not as important for literacy acquisition as phonological processing, transfer or lack of transfer can affect word recognition, especially in deep orthographies (Cunningham et al., 2011). A different script and a non-alphabetic L1 each add an extra layer of difficulty to the task of L2 reading. Students whose L1 is Korean, for example, are able to sound out English nonsense words faster than Japanese and Chinese students, whose L1 is (partially) logographic and who tend to rely more on visual processing (an effect from their L1; McBride-Chang et al., 2005), especially in the early stages of learning to read in English (Kim, Chistiansen, & Packard, 2015; Wang, Koda, & Perfetti, 2003). As readers approach more advanced proficiency, processing differences between L1 and L2 reading become increasingly similar (Dronjic & Bintan, 2016; Koda & Zehler, 2008; Verhoeven, 2017). According to Yamashita (2018) summarizing recent research, although many studies comparing logographic L1 students learning to read English as an L2 are inconclusive, a recurring finding is that "readers with the L1 non-alphabetic background tend to rely more on holistic visual-orthographic processing than analytic phonological processing compared with their counterparts with L1 alphabetic backgrounds or native speakers of English" (pg. 274). In her own study on the contributions of phonological and orthographic processing in developing EFL readers in high school, although orthographic processing was a greater predictor in the first two grades, its contribution gradually reduced with the contribution of phonological processing increasing as students became more proficient (Yamashita, 2018).

5. Implications for L2 Pedagogy

Transfer is influenced by a range of interacting factors, in particular L1-L2 language similarities or distance, and is difficult to predict (Chung, Chen, & Geva, 2018). It is clear underlying cognitive abilities influence reading in any language. It is also clear that some phonological awareness transfers, but that the L1 continues to influence reading ability, particularly until the learner becomes quite proficient. Phonological awareness in the L2 apparently can be developed through teaching or increased exposure (Geva et al., 2019; Hipfner-Boucher & Chen, 2016). Orthographic processing needs to be developed in the L2 in cases of different scripts, and particularly when learners have a logographic L1. In ESL situations, it has been found that learners from various L1s can develop reading skills at similar rates to their monolingual peers. In order to make up for early gaps, students need to be tested and profiled (in L1 and L2) to identify problem or potential problem areas (Geva et al., 2019; Kormos, 2020). This includes not only phonological awareness skills in both languages, but also phonological working memory, and phonological retrieval.

Traditionally, EFL reading pedagogy has focused

on developing vocabulary knowledge, background knowledge, and metacognitive strategies and not enough on lower-level processes such as word recognition and phonological and orthographic processes (Nasssaji, 2014). More time should be allocated to activities that develop decoding skills, such as the alphabetic principle, phonemic and phonetic awareness, phonics, and spelling and other forms of orthographic awareness (Nasssaji, 2014). Where such activities have been introduced, results have been promising (Allen-Tamai, 2019; Bunce, 2020; Huo & Wang, 2017; Walter, 2008), most appropriately in the early stages of learning to read, even before oral language proficiency becomes established (Geva et al., 2019). Along with intensive instruction and training, extensive fluency training should be conducted, with letter recognition, phoneme-grapheme pairing, word recognition (Cho et al. (2019), and repeated and extensive reading (Nassaji, 2014).

For EFL pedagogy in Japan, the evidence supports the notion that L1 language features and L1 reading experience affect L2 learners' reading sub-skills to some extent, but that transfer cannot be relied on to compensate for L2 skills. While L2 knowledge and skills (vocabulary, grammar, oracy) are most important for L2 reading comprehension, without sufficient attention to phonological awareness and orthographic awareness in English—critical abilities to develop the automaticity of word recognition upon which reading comprehension is dependent—reading instruction overall is likely to be less effective. Materials, instruction, and interventions should show greater acknowledgement of the need to develop these basic abilities, and show more sympathy for the enormity of the task that learners face. Transfer of general abilities still need to be developed as specific skills in the L2. More attention should be directed to developing L2-specific phonological and orthographic processing skills.

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