Morphological Awareness and Reading Comprehension: A Qualitative Study with Adult EFL Learners

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Abstract

The present studies utilized think-aloud protocols and retrospective interviews to examine the relationship between morphological awareness and reading comprehension among adult English-as-foreign-language (EFL) learners. Participants included four Mandarin-speaking college freshmen in Taiwan. Findings demonstrated salient differences between successful and less successful adult EFL readers in how they perceived and applied morphological knowledge. While successful readers valued derivational morphological rules for word inferencing and vocabulary building, less successful readers underestimated the significance of morphological knowledge in vocabulary learning. These findings, which further extend the scope of existing research, suggest that readers' perceptions of the usefulness of certain word learning and reading strategies should be incorporated in the componential view of reading in order to more comprehensively capture reading's multidimensionality.

Keywords: Morphological awareness, derivational morphology, adult ESL/EFL learners, reading, think-aloud, perception, application

1. Introduction

According to the componential view, reading comprehension depends on a set of specific linguistic and cognitive capacities (Perfetti, Landi, & Oakhill, 2005). Morphological awareness has been identified as one of those important capacities (Kuo & Anderson, 2008). Morphological awareness refers to one's understanding of the word formation rules of a language (Kuo & Anderson, 2006). For example, *national* is derived from *nation*, and the suffix *–al* denotes that *national* is an adjective. Morphological awareness may play a significant role in reading comprehension in English because morphologically-complex words make up 60-80% of the new words in English academic texts (Anglin, 1993; Guz, 2010; Nagy & Anderson, 1984). Empirical studies with L2 (second language) learners have shown that morphological awareness significantly contributes to L2 vocabulary learning and reading comprehension (Goodwin et al., 2013; Zhang & Koda, 2012). Existing research with L2 learners, however, has focused primarily on children and adolescents (e.g. Kieffer & Lesaux, 2012; McBride-Chang et al., 2008). Only a handful of studies have been conducted with adult learners (e.g., Miguel, 2012; Zhang & Koda, 2012).

Having ample academic vocabulary is particularly important for adult EFL/ESL learners because reading academic texts is one of the major channels through which these learners acquire professional knowledge in their fields of study. It has been estimated that adult EFL/ESL learners need to acquire a lexical size of 5,000 words to read authentic texts and approximately 10,000 words to comprehend challenging academic materials (Schmitt, 2000). To achieve the amount of vocabulary required to comprehend academic texts in English is thus a major task for adult L2 learners. Research has shown that the majority of EFL/ESL learners relied on rote memorization to learn new vocabulary (e.g. Huang, 2001), which may be ineffective as well as impractical, considering the limited time available for direct instruction.

Fostering adult L2 learners' ability to expand vocabulary and infer the meanings of unknown words through *morphological analysis* provides a feasible alternative. With enhanced morphological awareness, L2 learners may be able to acquire new vocabulary more efficiently (Kieffer & Lesaux, 2008), which may enhance their reading comprehension and support their academic studies. Among the different types of morphological awareness that have been investigated, knowledge of *derivational morphology* has received the most attention because it is particularly productive in academic texts in English (Proctor et al., 2012). Derivational morphology involves forming a new word with prefixes (e.g. *happy* and *un*happy) or changing a word's grammatical category with suffixes (e.g.*happ*ily is an adverb; *happ*iness is anoun).

1.1 Morphological Awareness and Lexical Inferencing

Morphological awareness coincides naturally with lexical inferencing. Lexical inferencing refers to the processes involved in "making informed guesses as to the meaning of a word in light of all available linguistic cues in combination with the learner's general knowledge of the world, her awareness of the co-text and her relevant linguistic knowledge" (Hasstrup, 1991, p. 40). Empirical studies have shown that L2 learners can use morphemic cues to infer the meaning of unknown or unfamiliar words (Nassaji, 2003; Paribakht & Wesche, 1999; Schmitt & Meara, 1997). For example, Bengeleil and Paribakht (2004) showed that morphological inferencing was one of the strategies adult EFL learners used to achieve successful L2 lexical inferencing. Zhang & Koda (2012) demonstrated through structural equation modeling that L2 learners' ability to use morphological clues, such as root identification and morphological segmentation, made a significant contribution to lexical inferencing.

1.2 The Role of Awareness in Language Learning

It has been well-established in the literature that awareness, defined as learners' conscious analysis of input (Schmidt, 1993), plays a critical role in L2 learning (Leow, 1997; Rosa & O'Neill, 1999). For example, in a study with Spanish L2 learners, Leow (1997) found that the more participants were aware of the targeted grammatical forms, the better they performed on an experimental task involving the use of crossword puzzles with the words in their targeted grammatical forms. In follow-up studies, Leow (2001, 2015) argued: a) different levels of awareness may lead to differences in processing, and b) more awareness contributes to greater recognition and accurate production of targeted forms. This is especially true for morphological awareness, which provides an additional application to vocabulary knowledge.

1.3 The Present Study

While previous studies have demonstrated that morphological awareness may be a strong predictor of L2 vocabulary and reading comprehension, existing research is limited in three respects, which will be addressed here. These limitations point to the need for the present study.

First, in terms of the dimensions of cognitive processes already examined, L2 learners' *perception* and *application* of morphological knowledge *during* reading remain unexplored. *Perception* is operationally defined as a learner's belief or attitude toward a specific domain of knowledge, which affects both the process and outcome of learning (Ellis, 2008). Investigating L2 learners' perceptions of morphological awareness reveals potential factors affecting their belief in the usefulness of morphological knowledge. *Application* is operationally defined as the use of a particular domain of knowledge while performing a specific task. The application of morphological knowledge has been studied in existing research (e.g., Leow, 1997, 2001, 2015). However, the research has been limited in the types of morphological knowledge studied (e.g., inflectional morphology of irregular verbs in Leow, 1997 and Leow, 2001) and in the authenticity of tasks (e.g., crossword puzzles in Leow, 1997 and Leow, 2001). The present study aims to fill this gap in the literature by focusing on adult EFL learners' application of *derivational* morphology knowledge, which is the most important type of morphological knowledge for processing academic texts in English (Kuo& Anderson, 2006), while reading expository texts, a more authentic task.

Second, regarding research methodology, the majority of empirical studies on morphological awareness have been quantitative, using tests to assess learners' morphological awareness and applying statistical analyses to examine the relationship between morphological awareness and other literacy-related variables such as vocabulary and reading comprehension (e.g., Kieffer & Lesaux, 2008; Zhang & Koda, 2013). Quantitative research tends to focus on the relationship among learning *outcomes*. Therefore, this body of research needs to be further complemented by qualitative research, which allows us to better understand the cognitive *processes* involved in acquiring and utilizing morphological knowledge. Think-aloud protocols have been widely used in qualitative research that studies the cognitive *processes* involved in L2 learning (e.g, Lau, 2006, Leow, 1997, 2001; Jiménez, 1997; McKeown & Gentilucci, 2007; Pritchard & O'Hara, 2006; Zhang, 2010). This method solicits participants' thoughts while they are performing a task. While it has the advantage of probing mental processes involved during reading, learners may be unable to articulate all their thoughts because comprehending texts in a second language is cognitively demanding. To address this limitation, the present study combines think-aloud protocols with immediate retrospective interviews (Egi, 2004; Lau, 2006), which allow researchers to follow up with and further probe responses provided during think-alouds. Data collected through a combination of the two methods presents a more comprehensive picture of L2 reading cognitive processes, particularly the use of morphological knowledge.

Finally, with regard to the research design, there is a need to examine how successful and less successful readers differ in the way they acquire and use morphological knowledge. Comparison of the cognitive processes involved in reading between successful and less successful readers pinpoints exactly what sub-skills differentiate the two groups of readers and thus can yield findings with significant theoretical and practical implications (Jiménez, García,& Pearson, 1996). However, such a design has only been used to study the use of morphological knowledge among young monolingual children (Fowler & Liberman, 1995; Stoltz & Feldman, 1995). To our knowledge, the present study is the first that compares the use of morphological knowledge between successful and less successful adult EFL readers.

To recapitulate, the present study aims to fill important gaps in the literature and to extend the scope of existing research by using think-aloud protocols and retrospective interviews to examine the relationship between morphological awareness and reading comprehension among adult EFL learners. We address the following two research questions:

1. How do successful and less successful EFL readers differ in their *perception* of derivational morphological knowledge?
2. How do successful and less successful EFL readers differ in their *application* of derivational morphological knowledge during reading?

2. Methods

2.1 Participants

Participants include four Mandarin-speaking college freshmen in Taiwan. They were divided into two proficiency groups based on their scores on the English section of their college entrance exam, which focused on reading; about 80% of the questions pertained to reading comprehension. The two successful readers scored above the 60th percentile on the exam among approximately 76,000 test takers in the same year: Sherry was at the 80th percentile, and Wilson was at the 60thpercentile. The two poor readers scored below the 30th percentile: Wendy was at the 25th percentile and Jack was at the 10th percentile. At the time of data collection, all four participants had learned English for about ten years.

2.2 Instruments

Instruments included two expository texts with a total of 600 words, among which 30 were morphologically-complex words. Many of these morphologically-complex words were critical in understanding the key information or supporting details in the texts.

2.3 Procedures

Data collection consisted of two parts: think-aloud protocol and retrospective interview. Data was collected individually from each participant. The think-aloud protocol was administered first to examine the cognitive and Meta cognitive processes involved in reading. The participants were given explicit instructions on how they should think aloud, including a short demonstration and practice.

They were then asked to read the texts silently and circle unknown words. Upon finishing a paragraph, participants were asked to verbalize what they thought the paragraph was about by orally translating the text into their first language (L1), Mandarin, sentence by sentence. Research suggests that allowing participants to respond in their L1 can reduce the cognitive load and lower their anxiety level, thus soliciting more accurate information (Alderson, 2000). Once participants finished reading all the paragraphs in a text, they were asked to review the entire text again and then complete five multiple-choice comprehension questions. While participants were answering questions, they were asked to verbalize how they constructed their understanding of the text as well as how they made their answer choices.

The retrospective interview was conducted immediately after each participant completed the think-aloud reading comprehension task with the two texts. During the retrospective interview, participants were asked open-ended questions, which included a) strategies they used to comprehend the text and to infer the meaning of words they had never seen before and b) the specific difficulties they had in understanding the texts. They were also asked whether they had previously learned the morphologically-complex words in the texts and, if not, how they inferred the meanings of these words. Participants were encouraged to articulate their thoughts freely. The think-aloud protocols and retrospective interviews together provided an in-depth understanding of each participant's thoughts and meaning-making process, thus allowing us to identify and analyze reading behaviors from the learners' perspectives.

2.4 Data Analysis

Each data collection session, which included a think-aloud protocol and a retrospective interview, was video-recorded in its entirety, transcribed, and coded for analysis with N-Vivo10 coding software. The constant comparative method (Strauss & Corbin, 1990) was conducted to analyze patterns in participants' perception and application of morphological knowledge and the relation with vocabulary learning, reading comprehension, and reading strategies. The analysis framework developed by Jiménez, García, and Pearson (1996) was also adopted to identify similarities and differences between successful and less successful readers.

3. Findings

Data and findings are presented to address the two research questions:

1. ***How do successful and less successful adult EFL readers differ in their perception of derivational morphological knowledge?***

Results indicate that successful readers both valued morphological knowledge, particularly derivational morphological rules and regarded morphological knowledge as a powerful tool that can facilitate word inferencing and vocabulary building. For example, Sherry believed that understanding derivational morphological rules helped with vocabulary expansion:

Sherry: I learned some prefixes and suffixes before. They're helpful for making correct guesses when I run into new words. Like bi- *means two and* tri- *means three. Then I can infer what* "bilingual" *and* "trilingual" *mean correctly. They're quite useful.*

Similarly, Wilson perceived knowledge of word structure and affixes to be beneficial for reading comprehension:

Wilson: I think knowing derivational morphological rules is very useful for reading. If I start with the word stems, prefixes, and suffixes, I don't need to learn so many words through rote memory. It would be easier. If you know the rules, you may decompose a word into parts and put them together. Even if you do not know what the word means, you could infer its meaning based on the stems, prefixes, and suffixes.

Both Sherry and Wilson believed that learning word families through affixes could effectively expand their vocabulary size. These two successful readers viewed derivational morphological knowledge as a vocabulary booster and clearly recognized the usefulness of morphological rules in lexical inferencing.

Contrastingly, the two less successful readers were found to underestimate the significance of morphological knowledge in vocabulary learning and inferencing. For example, Wendy did not perceive morphological knowledge to be important for interpreting the meaning of new words because she thought that her main problem was a lack of understanding of word stem meanings.

Wendy: Even if I know the meaning of a certain affix, I still can't figure out the meaning of the whole word because I don't know the word stem...It doesn't seem to work for me.

Likewise, Jack never mentioned any of the derivational morphological rules during the think-aloud or the retrospective interview. When being asked why he would not associate a new word with its word families, he responded,

Memorizing a new word is difficult enough for me, let alone learning it along with other words that share the parts with the new word. It's too complicated.

When asked whether he would try to expand his vocabulary through learning the rules of derivational morphology, Jack was skeptical:

I can't even remember the basic word stems. And I have to remember other sets of rules? That's too much.

Rote memory was the primary strategy Jack used to learn new vocabulary.

Thus, while the two less successful readers underestimated the importance of morphological knowledge, the two successful readers valued it, particularly perceiving derivational morphological knowledge as highly beneficial.

2. How do successful and less successful adult EFL readers differ in their application of derivational morphological knowledge during reading?

Results show that the two successful readers consistently applied derivational morphological knowledge during reading while the less skilled readers exhibited inconsistent or no application of morphological knowledge. The two skilled readers, Sherry and Wilson, demonstrated more advanced morphological awareness and applied morphological knowledge whenever they attempted to interpret the meaning of a new morphologically-complex word. They referred to both prefixes and suffixes to determine the grammatical category of new words and to infer their meanings. In general, the two successful readers identified the meaning of word stems first before inferring the meaning of an unknown word as a whole:

Sherry: I would infer the meaning of an unknown word based on its stem and prefix or suffix. Like "ize" is averbal suffix. Then I'll look at the word stem to figure out its meaning...Most of the time, I can recognize words that share the same stem but have different endings.

Sherry self-reported that in most cases she could easily identify the relationship between words that shared the same stem but had different suffixes.

The two successful readers also demonstrated their ability to identify the orthographic similarity between new words and their derivational forms. For example, retrospective interview data revealed that the two successful readers had previously learned *block*, *direct*, *balance*, *relieve*, and *insert*, but not *blockage*, *redirect*, *imbalance*, *relieving*, or *insertion,* which were the morphologically-complex words contained in the texts read during the think-aloud. Analysis of the think-aloud data showed that despite not having seen these morphologically-complex words, the successful readers were able to instantly identify the stems of these words, relate them to their derivational form, and unlock the meaning of these words.

Sherry:I knew what "block" mean. I didn't learn "blockage" before, but it looks just like "block." It's so obvious. The only difference is the "-age" at the end, so it's a noun.

Several reading comprehension questions were designed to examine participants' application of morphological knowledge. For example, one reading passage stated, "…the body *continually* produces very small amounts of electricity…" with one of the multiple-choice items being "the body *sometimes* produces small amounts of electricity." If the participant knew that *continually* was derived from *continue*, he/she would not have chosen the item containing *sometimes*. The think-aloud data showed that the two successful readers recognized the derivational form of *continue* and immediately eliminated the incorrect choice that included *sometimes*. For example,

*Sherry: Answer A is incorrect because it says "*the body **sometimes** produces small amounts of electricity,*" but in the text it says "*the body **continually** produces very small amounts of electricity,*" instead of **sometimes**.*

For successful readers, advanced morphological knowledge provided faster access to words meanings and enhanced their comprehension. This finding was corroborated with data from the retrospective interview:

Sherry: It is easier to guess the meanings of words with common prefixes or suffixes. Some words without prefixes or suffixes are short, but I don't have a clue to guess what they mean...If I can recognize words instantly, I'll have more time to focus on the main idea and details.

In contrast, less successful readers' exhibited underdeveloped morphological awareness and seldom used morphology to infer word meaning. For example, Wendy showed minimal understanding of morphological knowledge. The retrospective interview data showed she knew the meanings of the prefixes *im-*, *re-*, and *dis-*. However, she was not able to consistently apply such knowledge to words in the texts containing these prefixes during the think-aloud. Although Wendy knew that the prefix *dis-* in *disappear* means *not*, she failed to use this significant clue to comprehend the sentence. She misinterpreted "*he disappeared*" as "he did not show up," instead of recognizing that the sentence meant the person went from being present and visible to being absent and/or invisible. Likewise, Jack did not recognize *redirect* as a derivational word of *direct* with *re-* denoting *again*, although the retrospective interview data showed that he knew what *direct* meant.

The two less successful readers not only overlooked the importance of morphological knowledge, they were also insensitive to morphological changes. Both of them had difficulty identifying the association between word stems and their derivational forms. More specifically, they had difficulty inferring the meaning of morphologically-complex words with stem words that they had already learned. For example, at least four morphologically-complex words (i.e., *competing, insertion, reducing, relieving)* in the two texts had stem words (i.e., *compete, insert, reduce, relieve)* that were taught in the freshman English reading class. However, the think-aloud data showed that neither Jack nor Wendy recognized any of these morphologically-complex words.

To sum up, less successful readers failed to use morphological knowledge to infer the meaning of unknown vocabulary in their attempt to comprehend the texts. They also seemed to have processing difficulties beyond vocabulary.

4. Discussion

Findings from the present study revealed salient differences in the perception and application of morphological knowledge between successful and less successful adult EFL readers. First, with regard to the perception of morphological awareness, successful EFL readers valued morphological knowledge and viewed it as a powerful tool for vocabulary inferencing during reading**.** In contrast, less successful readers underestimated the significance of morphological knowledge. While they recognized the importance of vocabulary, they were unaware that morphological knowledge can expedite vocabulary learning. Less successful readers perceived morphological knowledge as being disconnected from vocabulary learning or reading comprehension.

Successful EFL readers perceived learning morphological rules as a booster for expanding vocabulary, though it was considered a burden by less successful readers. This finding corroborates previous research that low levels of morphological awareness may lead to difficulty in acquiring academic vocabulary and developing reading comprehension (Kieffer & Box, 2013). Moreover, this finding highlights the significance of morphological knowledge in vocabulary expansion and reading comprehension for interventions targeting morphological awareness, a fact meriting explicit acknowledgement.

Our second research question addressed the application of morphological knowledge *during* reading. Results show that successful and less successful EFL readers differed substantially in their ability to apply morphological knowledge to infer the meaning of unknown words. Successful readers were more dexterous than less successful readers in applying this knowledge during reading. With greater knowledge of word structures and word formation rules, successful readers were able to identify the connection between word stems and their derivational forms, which facilitates lexical inferencing.

In contrast, less successful readers displayed limited ability to apply morphological knowledge in vocabulary inferencing. They showed minimal indication of Meta cognitive awareness in applying morphological rules to infer the meanings of unknown words. Consistent with findings from previous studies (Kuo & Jiang, 2014), the present study suggests that adult EFL learners who are less successful readers have only partially-developed morphological awareness and tend to use a whole-word approach without using morphological knowledge to decompose the word parts. Their lack of awareness of word structures and word formation rules prevented them from recognizing words belonging to the same word family. Thus, the less successful readers had difficulty identifying the morphological connections between previously-learned words and their derived forms. Using think-aloud protocols and retrospective interviews, our findings confirm speculations made in previous qualitative (Leow, 1997, 2001) and quantitative studies (e.g., Gengeleil & Paribakht, 2004; Kieffer, & Lesaux, 2008; Zhang & Koda, 2012) that higher levels of met cognitive awareness of a particular L2 linguistic structure may lead to more efficient recognition of words sharing the same structure.

Our findings further demonstrate that such Meta cognitive advantage extends to the application of derivational morphology, critical for expanding academic vocabulary, in performing an authentic task such as reading expository texts.

In conclusion, the present study extends the scope of existing research by showing that successful readers and less successful readers differ not only in the levels of their morphological knowledge but also in their *perceptions* of the usefulness of morphological knowledge as a means for vocabulary expansion. In addition, differences exist in how these two groups of readers *apply* their morphological knowledge *during* reading. These findings suggest that readers' perceptions of the usefulness of certain word-learning and reading strategies should be incorporated in the componential view of reading in order to more comprehensively capture the multidimensionality of reading.

4.1 Limitations and Directions for Future Research

The present study has several limitations that warrant future research. First, participants were categorized into successful and less successful readers based on the percentile ranking of the English section of the College Entrance Examination. Approximately 80% of the questions on the exam focused on reading comprehension, and there was a sizable number of test takers (76,000). Nonetheless, it was a regional test used only in Taiwan. Future research may want to consider using a standardized reading comprehension test, such as retired TOEFL tests, to allow for comparison of participants across nations. Second, our study used think-aloud protocols and interviews to obtain data regarding to what extent participants comprehended the text and knew the meaning of morphologically-complex words embedded in the texts. While this approach allows for an in-depth understanding of the cognitive processes involved in comprehension and use of morphological knowledge, it would be helpful to also have data about their vocabulary size and general morphological awareness because such information can help to understand whether readers with similar skills but different vocabulary sizes and/or levels of morphological awareness would utilize morphological knowledge differently. Future research may want to include tests commonly used in studies with ESL/EFL participants, such as the 3,000-word Vocabulary Level Test by Nation (2001) and the derivational awareness tests by Carlisle (2000) and Carlo et al. (2004).

Findings from this study also have important practical implications. Our findings reveal that less successful adult EFL readers are characterized by a) limited ability to infer the meanings of morphologically-complex words and b) lack of awareness of the importance of morphological awareness. This observation paves the way for our next study, in which we will develop interventions that target less successful readers and address both their misconceptions and the specific challenges they have in applying morphological knowledge during reading.

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