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Empirical Research on Native Chinese Speakers Reading in English: Data Driven Issues and Challenges

Cindy Brantmeier
Washington University in St. Louis

Xiucheng, Yu
Northeast Normal University in China

ABSTRACT

Mastery of English in China has gathered increased prominence due to the need to foster cultural, political, and economic connections worldwide. Reading is an obvious skill of vital importance for advancing efforts as a player in the world economy. The present article examines research published in academic journals in Chinese and English to specifically explore the variables investigated and underscore the directions of future research. Through the detailed summary, the authors assert that more research should examine the effects of passage content, topic familiarity, and metacognition and offer corresponding implications for reading material developers and test constructors in China.

INTRODUCTION

Since the turn of the century, the English language has become increasingly popular in China, as evidenced by policy documents issued by the Ministry of Education and recent scholarship (Feng, 2009; Hu & Commeyras, 2008). Statistics documented by Wen and Hu (2007) cite an overwhelming number of students studying English across all stages of instruction, including primary, secondary, and university levels. In 2007, there were approximately 850,000 teachers of English in China (Wen & Hu, 2007), which further substantiates the growing demand for English language learning in China.

Many language programs around the world place emphasis on reading as the key skill for academic success. Reading is also the skill most often utilized beyond the confining limits of the classroom, mainly due to advances in technology that offer more exposure to reading materials. In the past fifteen years, research on second language reading has increased significantly (Carrell & Grabe, 2002), and during the past few years many books and special volumes have been published on the topic (Brantmeier & Dragiyski, 2009; Brantmeier & Koda, 2009; Brantmeier & Pulido, 2010; Grabe, 2009; Han & Anderson, 2009; Hudson, 2007; Koda, 2005), thus demonstrating the importance of the topic worldwide. In China, people are motivated to read for

both academic and business reasons, and as previously documented with Chinese students studying English (Dong, 2003; Feng, 2009), priority has been given to reading skills over speaking, listening, and writing. More recently, Cheng and Good (2009) directly state that reading in English may be the most important of the four skills required by students. This assertion echoes the tradition of the TOEFL examination and the College English Test in China, which both highlight reading over other language skills (Feng, 2009). Furthermore, the report written by the Ministry of Education of China (2001) specifies particular techniques to teach reading, such as strategy training.

Recently, Pang (2008) provides a compelling argument for more research on English reading in China that includes a review of research in China from the past twenty years. Pang highlights three factors that demonstrate qualities of good and poor readers: linguistic, cognitive, and metacognitive. The author's profile of good and poor readers serves as a foundation and catalyst for more investigations on this topic.

Given the great emphasis on English reading skills in China in the past and present, this article examines scientific research published during a five year period, both in journals written in Chinese and in journals published outside of China.

Contemporary L2 Reading Theory

Reading in a second language is a complex and sophisticated process. Both text-driven and reader-based factors have been included in reading models for quite some time (Bernhardt, 1991). This integrative view on L2 reading also takes into account both reading development and reading proficiency. Specifically, Bernhardt's (1991) pioneering model includes micro-level variables, such as word recognition, phonemic/graphemic features, and syntax, as well as macro-level factors such as topic familiarity, background knowledge, and other knowledge-driven variables (Brantmeier, 2004). Bernhardt's (2005) compensatory model of L2 reading also incorporates unexplained variance. In this conceptual framework, which is grounded in Stanovich's (1980) theory of reading, knowledge sources account for other causes that may be deficient or non-existent. The model demonstrates that L1 literacy knowledge and language knowledge (highlighting vocabulary) account for approximately fifty percent of the variance in L2 reading, and it also includes variables yet to be researched and explained. As described in Brantmeier (2006), Bernhardt's (2005) model demonstrates that knowledge sources appear to function synchronically, interactively, and synergistically.

In light of contemporary L2 reading models, the present article attempts to synthesize data-driven research on reading in English with native Chinese speakers in order to substantiate and offer new directions for research. In the remaining article, the authors offer an overview of selected research published in both Chinese journals and journals outside of China in order to highlight issues and challenges faced by both researchers and practitioners. Much of the research reviewed does not offer a description of the variations between reading in Chinese and English, but most recently Tong and McBride-Chang (2010) include a comparative analysis on reading in both languages. They include details concerning phonological variables, orthographic differences, and morphological aspects. (For a succinct and thorough explanation of cross-language differences between reading in Chinese and English, see Tong & McBride-Chang, 2010.)

REVIEW OF RESEARCH PUBLISHED DURING THE PAST FIVE YEARS

Methods

Initially the authors examined published research in the twelve CSSCI (Chinese Social Science Citation Index) journals on foreign language research written in Chinese during the last ten years and found that 147 articles treat reading in English. Search criteria included the key words such as "reading," "foreign language reading," and "reading in English." Most of the articles were theoretical or focused on instructional techniques, and only some publications included data-driven evidence on the topic. In the last five years (2005-2009), 67 articles were published on this topic in these Chinese journals (note that in two of these journals, no research on reading appeared during this time). Again, only a handful of articles involved empirical investigations on the topic. Of these 67 articles, 13 are from four leading journals disseminated to the field of foreign language research and teaching and are highlighted in this paper. A similar search of the ERIC and MLA databases were conducted to reach journals published in English, and 9 different articles appeared. The following review attempts to summarize some of this research, and additionally we created tables (see Appendices A and B) to more systematically highlight factors investigated, research questions formulated, and results found.

Journals Written in Chinese

Overall, there have been a wide variety of topics explored in reading research in the Chinese context. The most frequently examined factors included word-level issues in reading development in both adult and child learners of English (Wang, 2007; Peng & Tao, 2009; Zhang, X. & Qi, 2009; Niu, 2009), followed by transfer of reading ability from L1 (Chinese) to L2 (English) (Wu & Wang, 2006a, 2006b; Ju, Wang, & Zhou, 2007) and reading strategies (Duan, 2006; Liu & Guo, 2006; Xue, 2009). The remaining three articles investigated reading ability and instructional routines (Wei, 2005; Zhang, F. & Zhao, 2007) and one offers a test of theories on reading (Kong & Li, 2009).

Another distinct feature worth documenting is that most of the studies focus on reading of adult learners, that is, university students, and not children. A closer investigation reveals that most of these investigations focus on students who are English majors at the university level. This may be explained by the fact that research-oriented professionals generally hold positions at the university level, and consequently convenience samples are utilized to conduct research. Though foreign language instruction starts from the third grade of primary school as stipulated by *the National English Curriculum Standards for General Education* (Ministry of Education, 2001), practitioners in secondary and primary education are mostly teaching-oriented, so comparatively less research can be found in professional journals. Studies in learning foreign languages at the primary and secondary levels can be found, but this type of research remains sparse because of the difficulty in collecting data outside the university setting.

As is evident from Appendix A, vocabulary acquisition and other word-related issues in English reading have drawn great interest to researchers in an EFL context in China. In this situation, reading is the major means of retrieving information, and modern technology has offered learners more exposure to reading materials. Studies have shown that rapid processing and automaticity in word-recognition is a crucial factor in fluent L2 reading (see Pang, 2008). Wang (2007) investigated word-guessing strategies that Chinese EFL learners adopted in English reading. The 16 English-major juniors were found to use various knowledge sources in the

course of word-guessing. More specifically, they utilized world knowledge, discourse knowledge, semantic knowledge at the syntactic level, knowledge of word collocation, syntactic knowledge, and morphological knowledge. The knowledge of word collocation, syntax and morphology has a higher rate of success with L2 reading, while world knowledge has a lower rate. The study also found that both metacognitive and cognitive strategies are employed by the subjects in word-guessing, and that the use of the former is rare in frequency, but the success rate is the highest. The strategy of repetition (a cognitive one) is used most frequently, but its rate of success is the lowest. Findings yield important implications for vocabulary teaching with adult learners.

Peng and Tao (2009) examined the role of lexical decoding in L2 reading comprehension. The study was the only one of the 13 investigations that used child learners of English to examine L2 reading. Two separate experiments were conducted with 92 and 47 fourth graders respectively to examine the role of the different skills of word decoding and English language comprehension while reading in English. The interactive effect of word decoding and English language comprehension on English reading comprehension was also tested. Findings revealed that both word decoding and English language comprehension significantly accounted for unique variance in English reading comprehension, and a further examination of the independent contributions of English language comprehension to English reading comprehension revealed that, after controlling for general cognitive ability and Chinese language comprehension, it significantly accounted for 26% of the variances in English reading comprehension. Results also revealed that there is a significant interactive effect of word recognition, and the study offered empirical evidence for understanding the process of English reading among native Chinese-speaking children.

Another study that emphasized vocabulary acquisition in reading (Zhang, X. & Qi, 2009) specifically addressed the progress of incidental acquisition rate of word knowledge, the effects of the repetition of target words on lexical acquisition, and the interactive effects of the new words with other variables. Results indicated that knowledge of certain components of the target words were incidentally acquired by the participants, with the acquisition rate of spelling knowledge being 21.6%, and that of word meaning 15.5%. The author pointed out that in the process of natural reading, learners are provided with the opportunity of encountering new words in context, hence developing partial knowledge of them. And factors like noticing, application, and comprehension appear to facilitate full mastery of various component types of word knowledge that are involved in this process.

A comparative study was conducted by Niu (2009) to investigate the relationship of L2 vocabulary acquisition and collaborative output in comparison with reading input. Three tasks were designed to test L2 vocabulary acquisition of the 240 English majors and consisted of collaborative written output, collaborative oral output, and reading input. Results revealed that collaborative output, both written and oral, led to significantly more vocabulary acquisition and retention than reading input. The author explained the phenomenon in terms of the lexical learning mechanisms involved in collaborative output, task requirements, and the distribution of learners' attentional resources in task performance.

Transfer of reading ability from L1 to L2 is also a phenomenon that has received attention in experimental research in China. Wu and Wang (2006b) utilized a test with 211 first-year college students that was initially designed to examine reading ability in Chinese. Additionally, they used a second test with 60 subjects from Test 1 in order to examine their reading ability in English. The author further discusses two subsequent questions: whether the

transfer of reading ability includes the readers' building of mental representations, and whether there is the threshold effect in the transfer from L1 to L2. The nature of the psycho-cognitive mechanisms causing the threshold effect was also examined. It was concluded that reading skills may be transferred from L1 to L2, and this transfer consists of the readers' building of mental representations. Findings also reveal that the threshold effect does exist, being the result of combined effects of language proficiency with those psycho-cognitive mechanisms.

The additional studies addressing transfer of reading ability from L1 to L2 both focus on L1 thinking in L2 reading. Wu and Wang (2006a) and Ju, Wang, and Zhou's (2007) claimed that Chinese thinking is involved in English reading, although they differ in operational aspects of L1 use in L2 reading. Ju, Wang, and Zhou's (2007) research focused on L1 use in different difficulty levels and found that the amount of L1 used in reading passages of different difficulty levels remained almost the same. Wu and Wang (2006a) focused on L1 use with readers of different English proficiency levels, showing that the readers' reliance on Chinese declines with the increase of their English proficiency, but the use of Chinese is more supportive and effective. In terms of use, both Ju, Wang, and Zhou (2007) and Wu and Wang (2006a) summarized that Chinese is utilized in understanding and/or translating lexical, phrasal, and sentential meanings, as well as the structure and contents of the discourse. Chinese is also utilized in associating existing knowledge in order to interpret abstract notions and content. Ju, Wang, and Zhou (2007) made a finer distinction in the use of L1 in different difficulty levels of the reading tasks. In their study, it appeared that L1was more often employed to identify sentence meaning, summarize the content, and assess the learners' understanding of passages for the higher-difficulty-level reading tasks. It was more likely used for association and evaluation for the lower-difficulty-level reading tasks.

Reading strategies have also drawn great interest from researchers in the field of EFL teaching and learning. Three articles are dedicated to the study of reading strategies of Chinese learners of English at the university level. In an experimental study of the critical reading strategy training for 82 first-year non-English majors, Liu and Guo (2006) aim to find out the effects of learners' strategy use after training, and to what extent the training of critical reading improves the learners' critical thinking and reading comprehension. The authors claim that after the training of critical reading strategies, learners had a better awareness of strategy use, and training also increased the frequency of strategy use. The training of critical reading also appeared to improve learners' reading comprehension and increase the efficiency of reading. Little statistical evidence was present to support the assertions drawn. Duan (2006) more specifically addressed the types of strategies learners used such as attention to language input/output and collaborative study, in after-class English reading. A two-step examination was conducted in this study. 114 business majors studying English participated in a questionnaire survey, and 12 of them also participated in subsequent interviews. The study revealed that for after-class reading, the majority of the learners made no plan and neglected the effectiveness of language input. Furthermore, they paid little attention to language output and collaborative study while reading. The paper concluded with suggestions that address the problems found in this study in the teaching of English reading.

In a related study with 41 college students, Xue (2009) examined the influence of three cognitive skills of phonological awareness, orthographic processing, and Rapid Automatized Naming (RAN) on English as a Second Language (ESL) lexical decoding and discourse comprehension. Statistical evidence showed that orthographic processing played a positive role in lexical decoding and overall reading comprehension, whereas phonological awareness and

RAN could only predict decoding. This research also indicated that L2 reading was a complex process of multi-layer interactions of cognitive processes, which, in turn, was influenced by learners' native language.

It appears that the only research that directly examined grammar as a key factor in reading was Wei (2005), who discussed the role of L2 learners' sensitivity to grammar in reading comprehension. In an experiment investigating the relationships between grammar sensitivity and reading comprehension with 41 second-year English majors, the author concluded that the correlations are positive in an EFL context in China, and consequently the author offers implications of the research for English teaching in universities in China. In a study related to the strategy research cited earlier, with 186 non-English majors, Zhang, F. and Zhao (2007) utilized a questionnaire survey in order to investigate the nonlinguistic reading barriers for Chinese learners of English. They also interviewed 40 of these participants to triangulate results. Findings indicated that there are problems in the learners' interest in reading, reading times, habits, plans, and strategies. Based on the findings, the authors discuss a new extracurricular reading model.

Kong and Li's (2009) study was the only one dedicated to the test of a theory on the components of L2 reading ability. A sample of 20,000 TEM4 (Test for English Majors-4) papers was analyzed to investigate which of the three models on the components of L2 reading ability best fits the data gathered from this sample. It was found that the bi-divisible model fits the data of the TEM4 reading tasks better than the unitary one, and the multi-divisible model is unacceptable. The author also provided a theoretical basis for the improvement of TEM4 reading module based on the probe into the nature of TEM4 reading ability.

As depicted in the review, researchers in China comply with interactive models of L2 reading as they include both text-driven and reader-driven variables, such as vocabulary, L1, and strategies.

Journals Written in English

After a thorough review of journals that regularly publish investigations on second language reading (2005-2009), it appears that, during the past five years, nine articles treated reading in English by native Chinese speakers. The variable most frequently appearing in the research was reading strategies (Fraser, 2007; Hu, 2009; Kong, 2006; Nisbet, Tindall, & Arroyo, 2005; Zhang, L. & Wu, 2009). Vocabulary acquisition while reading was also examined by two different researchers (Cheng & Good, 2009; Knell, Haiyan, Miao, Yanping, Siegel, Lin, & Wei, 2007), and finally, one article treated both strategies and vocabulary in the study (Hu, 2009). The following is a summary of this research. Appendix B further organizes and details participants, research questions, and results for each study in order to further illuminate similarities and variations across studies.

In a pioneering study with advanced students of English at a university, Nisbet, Tindall, and Arroyo (2005) examined the relationship between language learning strategy preferences and English proficiency. They categorized reading strategies into the following six factors: memory, cognitive, compensation, metacognitive, affective, and social. They also included total learning strategies in the statistical analysis. The authors specifically sought to find whether specific categories of learning strategies predict L2 proficiency, and to add more dimension to the study, the researchers also included readers' gender as a factor. Findings revealed that metacognitive strategies were significantly correlated with the ITP-TOEFL score, and that a combination of metacognitive strategies and affective strategies was significantly correlated with English proficiency. Variations of scores for learning strategies and English proficiency were not

affected by readers' gender. The authors discuss how results highlight the need for further investigations that consider the influence of cultural context and autonomy on strategy use and proficiency. They present a thorough discussion of these factors and emphasize the need for future research to examine these topics in a variety of educational contexts in China.

Kong (2006) examined reading strategies utilized by four adult Chinese readers, and the author categorized strategies into two different factors: text-initiated and reader-initiated. The study specifically explored whether readers transfer their Chinese reading knowledge to L2 reading and whether language proficiency affects types of strategies used. Findings indicated that readers use a wide range of both types of strategies and that readers use more strategies while reading an English text than a Chinese text. Readers also showed more anxiety and self-doubt in reading the English texts. The four participants focused more on lexical issues while reading English materials, and they emphasized comprehension more while reading Chinese materials. Each individual reader transferred different strategies, and more specifically, the two higher L2 proficiency learners appeared to transfer higher-level cognitive and metacognitive knowledge while reading both texts.

Fraser (2007) utilized a factor that does not appear to be investigated in the past five years- reading rates. Readers of English as a second/foreign language acknowledge that one barrier they face is that they read slowly. Fraser examined L1 and L2 reading rates across five different tasks—scanning, skimming, normal reading, learning, and memorizing. These tasks are often included as part of strategy training. Findings revealed a significant difference between L1 and L2 reading rates and that this gap exists across different reading tasks (less to more complex). Specifically, results indicated a decrease in reading rate from the L1 to L2 across all tasks. The investigation also found that in all tasks, excluding scanning, that the L2 rate was at least fifty percent slower than the L1 rate. The author discussed how automatic word recognition skills may not be the only underlying source involved in the development of L2 reading rates.

Recently, Zhang, L. and Wu (2009) examined both metacognitive awareness and the use of reading strategies with adult readers. Strategies were classified as global, problem solving, and support. Findings revealed both a positive main effect for strategies and learner's proficiency. The high-proficiency group scored significantly higher than the low-proficiency group on both global and problem-solving strategies, but this was not the case for support strategies. The authors offered a thorough discussion of the importance of including metacognition as a factor in future experiments, and they also highlighted the need for more investigations that examine vocabulary-handling strategies, vocabulary size, and vocabulary depth, in relation to reading scores. This emphasis on vocabulary is not new to the research on reading in English by Chinese speakers.

With children studying at an English language immersion school, Knell et al. (2007) examined the language performance in both English and Chinese. In particular with regard to reading, they explored the differences between immersion and non-immersion students on different measures of English literacy and vocabulary. Findings indicated that the immersion students outperformed their counterparts on the English word recognition and vocabulary, and these differences were found at all grade levels, with the exception of one grade. Furthermore, results showed that phonological awareness and letter-name knowledge were strong predictors of English word recognition. Lastly, results demonstrated that Chinese character recognition was not affected by the immersion program. The researchers provided a very detailed discussion of the findings in light of prior research on L1 reading in English and offered grounded suggestions

for future research that will examine reading with students in early immersion programs across China.

Cheng and Good (2009) examined how effective word glosses are for both vocabulary acquisition and reading comprehension with university level students studying engineering and business. They utilized three different types of glosses—L2 Chinese glosses with L2 example sentences, L2 in-text glosses, and L2 marginal glosses. Findings demonstrated that all three gloss conditions influenced lexical recall, but this finding was not true for reading comprehension. Additionally, language proficiency was a benefit for gloss effects with some levels of proficiency but not others. The authors insightfully discussed this finding in light of prior research. Participants in the study held positive opinions about the use of word glosses for vocabulary acquisition and reading comprehension.

Hu (2009) incorporated both vocabulary acquisition and strategy use as factors in an investigation concerning reading instruction for children in three different elementary schools. The author found that instructors rely on both traditional methods (memorization of English sounds and letters) and contemporary methods (interactive, group activities) to teach reading. Hu offered a detailed exploration of how and what the different teachers teach in order to uncover issues involved in phonemic awareness and phonics instruction, and he revealed that memorization is not the only technique utilized by teachers. To teach both vocabulary as well as reading, teachers use direct translation, strategy training, and a variety of interactive classroom activities. Hu also investigated cultural knowledge through reading, and he found that the teachers ignored the fact that there are many different English speaking countries and cultures. Findings substantiate the need for further inquiry on what and how teachers are teaching reading in China.

In summary, in journals published inside and outside of China, it appears that research concerning native Chinese speakers reading in English has emphasized strategies and vocabulary. Findings of the present synthesis echo Pang's (2008) synthesis of research up to 2008. The issues for future research are discussed next.

IMPLICATIONS FOR FUTURE RESEARCH AND CONCLUSION

In the field of second language reading research, a plethora of studies have examined the effects of background knowledge and topic familiarity on second language reading comprehension (Carrell, 1983; Hudson, 1982; James, 1987; Johnson, 1981; Pritchard, 1990). The majority of this research has been conducted with learners in an ESL classroom setting outside of the USA across different instructional levels. Findings have generally revealed that content schemata, as seen as culturally familiar and unfamiliar, do influence first and second language reading comprehension. When EFL learners are more familiar with the content of the reading text, the better they comprehend the materials. It may be, then, that the English language is not the barrier, but that the topic of the reading impacts comprehension (Brantmeier, 2006).

It is well documented that there is a relationship between the reader and the text in the L2 reading process. As substantiated by the aforementioned research on passage content and background knowledge, the field of L2 reading has continuously shown great concern about the cultural contexts of the learner. Surprisingly, it appears that little attention has been given to this issue with native Chinese learners studying English. In fact, most of the studies published in Chinese utilize pre-existing texts that are taken directly from standardized exams, and the studies do not offer any details about text topics, content, or length. Only two of the studies mention

specifics about the reading texts (Wu & Wang, 2006a, 2006b). These two investigations discuss the source of the reading passages as well as length, but no details about topic or content of texts are provided.

Additionally, a close look at the publications in journals written in English reveals that only three include a description about the content of the reading passages (Cheng & Good, 2009; Hu, 2009; Kong, 2006). Cheng and Good (2009) went to great lengths to find a suitable text for the experiment, and in the end they accounted for both text difficulty levels and text topic. The final text selected was about unusual marriage ceremonies. Hu (2009) specifically examined cultural knowledge as a factor in L2 reading instruction and found that many teachers provide direct explanation about cultural differences. However, no specifics about how cultural knowledge impacts the L2 reading process are offered. Kong (2006) accounted for style, content, and length of reading passages in the investigation. The passages utilized were selected because of the familiar themes, such as attitudes toward money, assisted suicide, and communication patterns in humans and animals.

It is certainly understandable that researchers in China are using convenience sample populations as well as efficient reading passages, and findings highlighted in this paper reveal valuable insights to the topic of foreign language reading. Future research can build on this research and add a new dimension by accounting for text topics, passage content, and topic familiarity. These variables have been implicated with readers of English as a Second/Foreign language in different language learning environments, and given the significant findings, researchers should begin to consider these factors in China as well. When research is conducted on these variables, corresponding instructional implications could follow.

Likewise, given the importance of text topic in the L2 reading process along with the fact that most Chinese students learning English are motivated for professional reasons, studies that include domain-specific passages may prove beneficial. Recent research in the USA has examined L2 reading of scientific texts. With advanced L2 learners of Spanish at the university in the USA, an investigation reports no positive effects of embedded adjunct questions inserted into readings from a social psychology textbook. A study on the use of domain-specific texts (e.g., business, medicine, etc.), along with reading aids inserted within the reading passages, may help the lacuna in the database of research on this topic in China.

The present review of research also seems to emphasize metacognition as a key factor involved in the process of reading in English with native Chinese speakers. Most researchers, who have published in both Chinese journals and journals in English, seem to agree that metacognition involves the organization, use, and monitoring of cognitive activity throughout the reading process. Researchers include a description of metacognitive strategies utilized during and after reading. Given the known impact that metacognition has on both L1 and L2 reading, the topic of metacognition and L2 reading in China is timely and critical. Reviews of past and present research on L2 reading and metacognition highlight the importance of this factor in the L2 reading process across languages (Brantmeier & Dragiyski, 2009; Hudson, 2007; Zhang, L. & Wu, 2009). Brantmeier and Dragiyski (2009) validated an effective and informative inventory to use with use with adult L2 readers. The instrument, modified from Mochtari and Reichard's (2002) Metacognitive Awareness of Reading Strategies Inventory (MARSI), utilizes combinations of items that predict achievement on different assessment tasks with different types of readings. In the future, the MARSI could be tailored to the language programs in China and utilized with native speakers of Chinese who are studying English in order to provide more instructional guidance for the teaching of metacognitive strategies.

Through a review of the research published on native Chinese speakers learning to read in English, it is evident that the variables most widely included in the research to date relate to type and frequency of strategies and lexical acquisition. The following factors for future research are identified: passage content, topic familiarity, and metacognition. It is the hope of the authors of this paper that researchers will continue to examine the numerous mechanisms involved in this timely topic.

Cindy Brantmeier *is Chair of the Department of Education and Professor of Applied Linguistics and Education at Washington University in St. Louis. She is principal investigator in the Language Research Lab, director of the Program in Applied Linguistics, and co-director of the Graduate Certificate in Language Instruction.*

E-mail: cbrantme@wustl.edu

Xiucheng Yu *was a research associate at Washington University in St. Louis from 2009 to 2010, where he collaborated with Professor Cindy Brantmeier in the Language Research Lab. He is now Associate Professor of English and English linguistics at Northeast Normal University (NENU) in China. Professor Yu also serves as coordinator of the Writing Center at NENU and serves as deputy director of the English Department.*

E-mail: yuxc765@nenu.edu.cn

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Appendix A. Investigations on Reading in English with Native Chinese Speakers in Journals Published in Chinese Between 2005-2009

Author, Year	Participants	Research Questions	Results
Wei, Y. (2005)	41 second-year English majors in a university in Shanghai	(RQs not stated)* 1. What is the relationship between grammar sensitivity and reading comprehension?	Findings show a positive correlation between English grammatical sensitivity and reading comprehension.
Duan, Z. (2006)	1) 114 Business English majors (Questionnaire) 2) 12 of the 114 (Interview)	(RQs not stated) 1. What strategies are adopted by the Business English majors in after-class English reading? 2. How do learners view relationships between language input and output? 3. Do participants engage in collaborative learning in reading?	The majority of students make no plan for after-class reading in English. Students neglect the effectiveness of language input and pay little attention to language output and collaborative study.
Liu, W., & Guo, H. (2006)	82 first-year non-English majors in Beijing Jiaotong University	1. What are changes of strategy use after critical-reading strategy training? 2. To what extent can the teaching of critical reading strategies improve critical thinking and reading comprehension? 3. What are the differences in evaluations of the teaching of critical reading strategies and the traditional teaching methods? 4. What are the effects of critical reading on writing?	Critical reading strategy training appears to raise awareness of strategy use and to increase the frequency of strategy use. Teaching critical reading may help improve learners' reading comprehension and increase the efficiency of reading. Critical reading seems to improve learners' writing. Participants report being satisfied with critical reading.

Wu, S., & Wang, T. (2006a)	21(both Eng. & non-Eng. majors) including: 7 preliminary 7 intermediate 7 advanced	1. What differences are there among Chinese learners of English (with different proficiency levels) in the use of thinking in Chinese while reading in English? 2. What specific roles does Chinese thinking have in English reading?	With the increase of English proficiency, readers' reliance on Chinese declines, but use of Chinese is more supportive and effective; the proportion of the strategies used in identifying ideas and constructing meaning reduces while the proportion of the strategies used in cognitive and meta-cognitive monitoring increases. Different types of variables are identified, both supportive and non-supportive, in the following order: 1) to translate lexical items 2) to show uncertainty and/or doubt about interpretation of lexical items. 3) to generalize the meanings of chunks above the lexical and phrasal levels 4) to guess or eliminate meanings of chunks above the phrasal level 5) to predict the structure and contents of the discourse, and 6) to associate existing knowledge to interpret abstract notions.
Wu, S., & Wang, T. (2006b)	Test 1: 211 first-year college students (Test of Chinese) Test 2: 60 of the 211(Test of English)	1. Are reading skills transferred from Chinese to English, though there are dramatic differences between these two languages? Does the transfer of reading skills from L1 to L2 include the building of mental representations from the psycho-cognitive viewpoint? 2. Is there a threshold effect in the transfer from L1 to L2? 3. What is the nature of the psycho-cognitive mechanisms that cause the threshold effect?	Readers build mental representations in both L1 and L2 reading. The threshold effect is the result of combined effects of language proficiency with those psycho-cognitive mechanisms.
Ju, Q. H., Wang, W. Y., & Zhou, D. D. (2007)	8 sophomore non-English majors at Nanjing University	1. Is Chinese (L1) involved in the reading process of English (L2)? When and to what extent do learners of English rely on Chinese in the reading process? 2. Are there differences in the use of L1 in reading	These students used a noticeable proportion of L1 (54.8%) for translating, summarizing, and evaluating the content of the reading passages, and for associating the content of the passages with their own knowledge and experiences. The amount of L1 used in reading passages of two difficulty levels remained almost the same. Functions of L1 use differed in the two reading tasks: for the task that is higher in

		for learners of similar proficiency in English? What are the differences?	difficulty level, L1 was employed more often to identify sentence meaning, summarize the content, and assess the students' understanding of the passage, while for the task that is lower in difficulty level, L1 was more likely used for association and evaluation. When the same reading activities of the two reading tasks were involved, it is observed that students tended to use more L1 in the process of summarizing information of the lower-difficulty-level passage and relied more on their L1 for evaluating textual content and for assessing their comprehension of the higher-level text.
Wang, Y. (2007)	16 English-major juniors at a university	1. What is the rate of success of word guessing in Chinese learners of English? 2. What knowledge sources and inference strategies are used in the process of word guessing? 3. What is relationship between knowledge and strategies and the effects on word guessing?	a) Various knowledge sources have been used by subjects in the course of word-guessing, including world knowledge, discourse knowledge, semantic knowledge at the syntactic level, knowledge of word collocation, syntactic knowledge and morphological knowledge, of which the last three have a higher rate of success, while world knowledge has a lower rate of success. b) Both metacognitive and cognitive strategies are employed by the subjects in word-guess; the former including self-assessment strategy, while the latter including strategies like repetition (further broken down into word repetition and fragment repetition), analysis of word-formation, analogy, and self-questioning. The strategy of repetition is most frequently used, but its rate of success is the lowest. The self-assessment strategy is rarely used, but the rate of success is the highest. The results may have some implications for vocabulary teaching.
Zhang, F., & Zhao, T. (2007)	186 non-English majors in Jinan University (Questionnaire) 40 of the 186 (Interview)	(RQs NOT STATED) 1. What are the nonlinguistic reading barriers for Chinese learners of English (non-English majors)?	There are problems in their reading interest, reading time, reading habit, reading plan, reading strategies, etc. In order to solve these problems, a new extracurricular reading model is put forward in this paper.
Kong, W., & Li, Q. (2009)	20,000 TEM4 Sample papers (TEM: Test for English Majors)	(RQs NOT STATED) 1. Which of the three models of L2 reading ability components best fits the data gathered from TEM4 (2005) reading tasks?	The multi-divisible model is unacceptable while the bi-divisible model fits the data of TEM4 Test for English Majors (2005) reading tasks better than the unitary one. As a tentative attempt to probe into the nature of TEM4 reading ability, the present study provides a theoretical basis for the

		2. Are these components divisible?	improvement of TEM4 reading module.
Niu, R. (2009)	240 English majors (Freshmen) Female: 195 Male: 45 96: Collaborative written output task; 98: Collaborative oral output task; 46: Reading input task	1. To what extent can collaborative written output lead to productive and receptive L2 vocabulary acquisition in comparison with reading input? 2. To what extent can collaborative oral output lead to productive and receptive L2 vocabulary acquisition in comparison with reading input? 3. Do collaborative written output and collaborative oral output lead to different L2 vocabulary acquisition?	Collaborative output, especially collaborative oral output, led to significantly more vocabulary acquisition and retention than reading input did. However, collaborative written output and collaborative oral output did not bring about significantly different vocabulary learning. The findings were discussed with reference to the lexical learning mechanisms involved in collaborative output, task requirements, and the distribution of learners' attentional resources in task performance.
Peng, P., & Tao, S. (2009)	92 fourth graders in a Chinese primary school Ave. age: 10y2m Boys: 46 Girls: 46 47 of 92 word recognition task	1. What are the roles of the different skills of word decoding (word recognition and pseudoword reading) and comprehension on the English reading comprehension among native Chinese-speaking children? 2. Do word decoding and English language comprehension have interactive effects on English reading comprehension? 3. What is the effect of children's general cognitive ability on their English reading comprehension?	Both word decoding and English language comprehension, respectively, significantly account for unique variance in English reading comprehension after controlling for general cognitive ability. English language comprehension even significantly accounted for unique variance in English reading comprehension after controlling for Chinese language comprehension further. Moreover, a significant interactive effect of word recognition and English language comprehension was found on English reading comprehension. While children's general cognitive ability did not have significant direct effect on English reading comprehension, it had indirect effects on English reading comprehension via word attack. This study offered empirical evidence for understanding the process of English reading acquisition among native Chinese-speaking children. It also had implications for English reading instruction.

Xue, J. (2009)	41 Chinese college students at a university in Beijing	(RQs not stated) 1. Do the following three cognitive skills—phonological awareness, orthographic processing, and Rapid Automatized Naming (RAN) influence ESL lexical decoding and discourse comprehension?	Correlation analysis and stratified regression analysis have shown that orthographic processing plays a positive role in lexical decoding and discourse comprehension, while RAN and phonological awareness can only predict decoding. The results also show that ESL reading is a complex process of multi-layer interactions of cognitive processes, and this process is influenced by the native language.
Zhang, X., & Qi, L. (2009)	4 English majors (sophomore)	1. What is the progress and incidental acquisition rate of word knowledge (including spelling and meaning) during reading? 2. What are the effects of the repetition rate of target words on vocabulary acquisition? 3. What are the interactive effects of the encounter of new words with other factors?	The participants incidentally acquired knowledge of certain components of the target words. The acquisition rate of spelling knowledge was 21.6%, and that of word meaning 15.5%. The main function of natural reading in IVA is to provide the opportunity of encountering new words in context and help to develop partial knowledge of them. This process interacts with noticing, application, and comprehension and needs to facilitate full mastery of various component types of word knowledge.

**Note.* In some of the publications the research questions were not explicitly stated, so that authors formulated the questions.

Appendix B. Investigations on Reading in English with Native Chinese Speakers in Journals Published in English Between 2005-2009

Author, Year	Participants	Research Questions	Results
Nisbet D. L., Tindall, E. R., & Arroyo, A. A. (2005)	168 third-year English majors at Henan University in China (age 19-27)	1. What are the relationships among 6 categories of learning strategies, total learning strategies, and second language proficiency? 2. Which categories of learning strategies are predictive of L2 proficiency? 3. Is there a difference in learning strategy preferences and proficiency by gender?	Metacognitive strategies were significantly correlated with TOEFL score. Metacognitive strategies and affective strategies combined significantly correlated with English proficiency. Variations in learning strategy scores and proficiency were not influenced by gender.
Kong, A. (2006)	Four Chinese adult readers	1. What reading strategies (text-initiated or reader-initiated) do Chinese ESL Language learners us in comprehending texts in Chinese, their native language?	Participants utilize strategies more frequently when reading English texts than Chinese texts. Participants with high English proficiency levels demonstrate greater strategy use from Chinese to English. L2 proficiency does not predict higher level thinking strategies while reading.
Knell, E., Haiyan, Q., Miao, P., Yanping, C., Siegel, L. S., Lin, Z., & Wei, Z. (2007)	183 students in Chinese primary school (51 first graders, 61 second graders, 71 third graders)	1. Are there significant differences between the scores of immersion and non-immersion students on various measures of English literacy, vocabulary, and oral proficiency? 2. Are there significant different between scores of immersion and non-immersion students in Chinese character recognition? 3. Which factors best predict English word recognition?	Immersion students outperformed the non-immersion group on the measures of English vocabulary, word identification, and oral proficiency, without negative effects on their Chinese character reading. Phonological awareness and letter name knowledge are strong predictors of English word identification for immersion learners.
Fraser, C. A. (2007)	45 L1 Mandarin speakers at a university in Canada, 50 L1 Mandarins speakers at a	1. Is there a difference in L1 and L2 reading rates for each of five tasks? 2. Is there a L1 and L2 difference in task performance on	There is a gap between L1 and L2 reading rates and this gap persists across reading tasks. Findings reveal a decrease in reading rate from L1 to L2 across tasks. L2 proficiency did not predict L2 reading rate but did predict L2

	university in China	scanning, skimming, learning, and memorizing tasks? 3. Are there differences between the Canada and China group?	performance on the learning and memorizing tasks.
Cheng, Y., & Good, R. L. (2009)	135 undergraduate Mandarin speakers at a university in Taiwan	1. What are the effects of different types of word glosses on reading comprehension and vocabulary recall? 2. Does language proficiency influence the effectiveness of gloss conditions? 3. What pattern appears for vocabulary recall? 4. What are the attitudes toward learning vocabulary through L1 and L2 word glossing?	Overall, results revealed that glossing reading texts does enhance vocabulary acquisition and retention. Students showed positive attitudes toward the inclusion of vocabulary glosses in L2 texts.
Hu, R. (2009)	11 teachers who teach English at three different elementary schools in Beijing	1. What is taught in reading classes in elementary schools in Beijing, China? 2. How is reading taught in elementary schools in Beijing, China?	Seven aspects of knowledge were emphasized by the teachers—phonemic awareness, phonics, fluency, vocabulary, comprehension, grammar, and cultural knowledge. The instruction activities included a lot of interaction among and between students, which contradicts traditional Chinese classrooms that emphasize memorization when learning to read.
Zhang, L. J., & Wu, A. (2009)	270 Chinese students at a senior high school in Hainan province who are all enrolled in EFL courses	1. How often do students use global, problem-solving, and support strategies? 2. Which type do they use the most? 3. Does proficiency level impact choice and frequency of strategy use?	Overall, students used all three strategy types frequently. The high proficiency group used both global and problem-solving strategies more than their counterparts.