Extending the compensatory model of second language reading

Levi McNeil*

Graduate School of TESOL, Sookmyung Women's University, 610 Soonhun Gwan, Hyochangwan 52, Yongsan-Gu, Seoul 140-190, South Korea

Received 12 January 2011; revised 27 December 2011; accepted 12 January 2012

Abstract

Bernhardt (2005) proposed a compensatory model of second language reading. This model predicted that 50% of second language (L2) reading scores are attributed to second language knowledge and first-language (L1) reading ability. In this model, these two factors compensate for deficiencies in each other. Although this model explains a significant portion of L2 reading, much remains unknown. In particular, the compensatory model does not specify the relative contributions of strategic knowledge or background knowledge in L2 reading. Consulting the extant L2 reading literature, this paper proposes a model of second language reading, extending the compensatory model of second language reading. The proposed model predicts the shifting contributions to L2 reading of L2 language knowledge, L1 reading ability, strategic knowledge, and background knowledge. The paper concludes by offering a framework to investigate the explanatory power of the proposed model.

Keywords: Second language reading; Reading models; Compensatory processing; Linguistic threshold; Reading strategies; Background knowledge

1. Introduction

Views of second language reading have changed over the past thirty years. Until the late 1970s, second language (L2) reading was regarded solely as a language-based, bottom-up process, with comprehension resulting from successful letter, word, and sentence decoding. Then, riding momentum from first-language (L1) reading research that explained how a reader's knowledge influences lower-level processing (e.g., Goodman, 1968), psycholinguistic notions of reading took hold in L2 settings (e.g., Coady, 1979). With the collapse of purely one-way explanations of reading and the creation of new models in L1 research (e.g., Rumelhart, 1977), interactive concepts, which describe reading as a combination of simultaneous bottom-up and top-down processing, entered the L2 landscape (Carrell et al., 1988).

Bernhardt (1991, 2000, 2005) applied interactive concepts to create formal models of second language reading. The most recent version, the compensatory model of second language reading (henceforth, CM), reflects Stanovich’s (1980) concept of compensatory processing, where deficiencies in any knowledge source can be overcome by relying on other knowledge sources (e.g., readers applying contextual knowledge to aid poor word recognition skills).
CM utilized this compensatory notion to reflect a body of L2 reading literature showing that L2 language knowledge (e.g., grammar and vocabulary) and L1 reading ability (e.g., knowledge of text structure) play critical roles in second language reading. This model predicts that 50% of L2 reading scores are explained by these two factors.

Although the CM (Bernhardt, 2005) accounts for half of the variance in L2 reading, much remains unknown. Bernhardt listed reading comprehension strategies and background knowledge as potential sources to account for the unexplained variance in the model, and recent research suggests that these two components account for substantial variance in L2 reading. Synthesizing literature surrounding L2 language knowledge, L1 reading ability, reading comprehension strategies, and background knowledge this paper proposes to extend the CM by illustrating and predicting how these components contribute to second language reading at two different stages in L2 development.

In positing the model, this paper consists of four sections. First, the L2 compensatory model (Bernhardt, 2005) is reviewed, along with recent literature examining the roles of L2 language knowledge and L1 reading ability. Then, the strategic knowledge and background knowledge components in the proposed model are presented. The third section presents the model. The final section offers suggestions on ways to research the model.

2. Relevant literature

2.1. The second language compensatory model

The L2 compensatory model (Bernhardt, 2005) is a product of a long held theoretical debate. For decades, scholars discussed issues related to the possible contributions of L1 reading ability to L2 reading. L1 reading ability includes among other variables, knowledge of the letter-to-sound mappings, how texts are structured, how words and sentences are organized, and beliefs about the purposes of reading (Bernhardt, 2005: 140). L2 language knowledge includes vocabulary and grammar knowledge, impact of cognates, the linguistic distance between L1 and L2, among other factors. Two hypotheses dealing with these factors were proposed in the late 1970s. The first, the Linguistic Interdependence Hypothesis (Cummins, 1979), predicted that strong readers in L1 will be strong readers in L2. In this view, readers successfully apply to L2 texts the skills and strategies developed during first-language literacy experiences. The second, the Short-Circuit hypothesis (Clarke, 1980), stated that before readers can make use of their L1 abilities, they must first acquire a certain amount of L2 proficiency. Without meeting a threshold of target language knowledge, L2 readers will not be able to utilize a repertoire of L1 strategies. A number of studies attempted to address these hypotheses in the late 1980s and throughout the 1990s (e.g., Bernhardt and Kamil, 1995; Bossers, 1991; Brisbois, 1995; Carrel, 1991; Hacquebord, 1989). Summarizing the findings from this line of inquiry, Bernhardt (2005) wrote:

Considering that cognate and noncognate languages were studied; both children and adults were considered; and different measurement schemas employed; the studies produced remarkably consistent findings: They all estimated the contribution of first-language reading to second language reading to be between 14% and 21% and the contribution of language knowledge to second language reading performance to be around 30%. (p. 137)

Bernhardt (2005) pooled these findings to form cornerstone components for the L2 compensatory model (CM). The model is composed of three components—L1 literacy (i.e., L1 reading ability), L2 language knowledge, and unexplained variance—that are plotted over an x-axis of developing proficiency and a y-axis of comprehension. Two components of the CM, L2 language knowledge and L1 reading ability, predict 50% of second language reading comprehension. Among this explained portion, 30% results from L2 language knowledge and up to 20% is due to first-language reading abilities, based on the compensatory notion developed by Stanovich (1980). In this way, the CM represents L2 reading as a “juggling or switching process in cognition” (Bernhardt, 2005, p. 140), whereby, for example, a reader’s L1 reading ability can compensate for L2 language knowledge deficiencies.

The CM informs L2 reading in that it brings to the forefront critical components—L2 language knowledge and L1 reading ability—and places them within a framework of compensatory processing. The idea of readers consulting multiple knowledge sources in the act of comprehension is a concept that continues to be explored and refined in L1 reading (e.g., Pressley and Afflerbach, 1995; Walczyk et al., 2007) and offers an important theoretical perspective for second language reading because of the various difficulties L2 readers experience. For example, the literature is rife with accounts of second language readers having slower reading rates in L2 than in L1 (e.g., Chen and Donin, 1997), lacking appropriate cultural schemata (e.g., Droop and Verhoeven, 1998), and scoring lower on L2 reading
comprehension measures despite being strong L1 readers (e.g., Taillefer, 1996). A compensatory notion of L2 reading
helps explain how readers draw from various resources to construct meaning despite these obstacles. In its current
form, however, the CM struggles to maximally achieve its goal of emulating a juggling and switching of cognition
during L2 reading, mainly because it does not predict the contributions of variables outside of L2 language knowledge
and L1 reading ability.

Theoretical explanations and empirical investigations suggest that background knowledge and reading comprehen-
sion strategies are sources of compensation in the reading process. For example, background knowledge is
believed to be a major factor in constructing a mental model of comprehension during normal, unimpeded
comprehension (Kintsch, 1998), while also aiding in lower-level word processing (Chen and Donin, 1997). Addi-
tionally, reading comprehension strategies are tools readers use to monitor and overcome comprehension problems
(Baker and Brown, 1984) and these strategies contribute to L2 reading (e.g., Phakiti, 2003, 2008). Adding these two
strategies and L1 reading ability, L2 language knowledge, and L1 reading ability), to include the components of strategic knowledge and background knowledge. These predictions are made for readers with lower and higher levels of L2 proficiency.

In positing the proposed model, research is reviewed briefly to illustrate the meaningful roles played by L2
language knowledge and L1 reading ability in L2 reading, before discussing how strategic knowledge and background
knowledge function within the proposed model.

2.1.1. The contributions of L2 language knowledge and L1 reading ability to L2 reading

As discussed above, a number of studies have investigated the relative contributions of L2 language knowledge and
L1 reading ability to L2 reading. These studies provide evidence for both the Linguistic Interdependence (Cummins,
1979) and Short-Circuit (Clarke, 1980) hypotheses by showing that L1 reading ability plays a role in L2 reading, even
for low L2 proficiency students, and that its impact increases with L2 language development. These findings support
the original CM and are reflected in the proposed model. The proposed model differs from the original CM, however,
in that it predicts that L1 reading ability, not L2 language knowledge, better accounts for L2 reading for high-
proficiency readers. Many studies (e.g., Asfaha et al., 2009; Bernhardt and Kamil, 1995) have computed estimates
for each of these variables by aggregating participant scores across L2 proficiency groups. Estimates derived in this
way mask the unique contributions these variables play at different proficiency levels. As discussed by Fecteau (1999),
the relative contribution of L1 reading ability to second language reading is weakened if the sample from which that
data is drawn includes proportionately more lower-level than higher-level L2 proficiency participants. Therefore,
studies presenting data related to specific proficiency groups, such as those reviewed below, are important. This
section aims to demonstrate that the correlation between L1 and L2 reading strengthens over time and that L1 reading
ability is a stronger predictor of L2 reading than L2 language knowledge for high-proficiency readers.

2.1.2. L2 language knowledge and L1 reading ability and reading comprehension

Using regression analysis to analyze data from 809 Korean middle and high schools students on measures of L1
reading ability, L2 language knowledge, and L2 reading, Lee and Schallert (1997) found that L2 language knowledge
explained 56% of L2 reading variance and L1 reading ability explained 30%. However, after dividing the students into
10 groups based upon L2 proficiency, data showed that the correlation between L1 and L2 reading was much stronger
for the highest group (i.e., \( r = .47 \)) than the lowest group (i.e., \( r = .22 \)). The researchers noted that trends in the data
show a “continuous, positive relationship between L2 proficiency level and the ability to transfer some L1 reading
strategies and skills to L2 reading” (p. 728). Therefore, while L1 reading ability accounted for 30% of L2 reading
variance for the entire sample, it is likely that this percentage would be larger for those with high L2 proficiency.

Song (2001) reported similar findings. Song collected data from 424 Korean university EFL learners to investigate
the contributions of L1 reading ability and L2 language knowledge to L2 reading. Participants were divided into six
groups based upon L2 proficiency scores. Results showed that L1 reading ability for the two lowest levels was weakly
associated with L2 reading (i.e., \( r = -13, r = .07 \)), while L1 and L2 reading were strongly correlated for the two
highest groups (i.e., \( r = .62, r = .67 \)). Correlational data from this study and others (e.g., Lee and Schallert, 1997;
Schoonen et al., 1998; van Gelderen et al., 2007) show that the relationship between L1 and L2 reading
strengthens as L2 proficiency increases, and this trend is portrayed in the original CM and the proposed model.
Other studies employing regression analyses suggest that L1 reading ability is a stronger predictor of L2 reading for higher-proficiency L2 readers than L2 language knowledge. Among other research foci, Fecteau (1999) investigated the contributions of L1 reading and L2 proficiency to L2 reading for 24 advanced-level, French foreign language learners. Results showed that L1 reading recall scores and L2 proficiency accounted for 48% of the variance in L2 reading recall scores. However, in this model, only L1 reading ability was a significant predictor of second language reading, L2 proficiency was not. Fecteau explained that, “…L1 and L2 reading skills are interrelated among more proficient FL learners and that L1 reading skills contribute more to L2 comprehension than does L2 proficiency” (p. 484). This study suggests that L1 reading ability is a stronger predictor for advanced-level L2 readers than L2 language knowledge.

Two other studies further underscore the importance of L1 reading ability for L2 readers with high-proficiency. First, Bossers (1991) gathered data from 50 Turkish L1, Dutch L2 learners. Bossers found that for low L2 proficiency readers, L2 language knowledge was the strongest predictor, whereas L1 reading ability was stronger than L2 language knowledge for high-proficiency readers. These findings are echoed in the second study. After collecting data from 52 L1 Bosnian, French L2 learners over a one-year period and dividing them into high and low L2 language knowledge groups, Pichette et al. (2003) found that “for the HiL2 group, the significant predictor of L2 reading ability was L1 reading ability, whereas for the LoL2 group, the significant predictor was L2 language knowledge” (p. 398). These two studies and others (e.g., Carrell, 1991; Fecteau, 1999) suggest that L1 reading ability is a stronger predictor of L2 reading than L2 language knowledge for learners with high L2 proficiency.

2.1.3. Placement in the proposed model

The original CM (Bernhardt, 2005) predicted that the contribution of L1 reading ability increases over time. The literature reviewed in this section supports this prediction, and this is mirrored in the proposed model. Contrary to the CM, however, studies reporting data from participants with high levels of L2 proficiency suggest that L1 reading ability is a stronger predictor of L2 reading than L2 language knowledge for this population. Fig. 1 reflects these trends. The figure presents two pie charts, each representing reading comprehension for readers at either lower- or higher-levels of L2 proficiency. The sections within each pie are the components that contribute to second language reading. The larger the section, the stronger the component predicts performance. For all the figures presented in this paper, these sections represent the approximate contributions of each component to second language reading and thus do not depict precise values. The figures also include an unexplained variance component. In Fig. 1, this component, in line with the original CM, shows that roughly 50% of second language reading remains unaccounted for when only these two components serve as predictors.

2.1.4. The contributions of strategic knowledge to L2 reading

Strategic knowledge plays a critical role in compensatory processing, which is at the core of the CM (Bernhardt, 2005) and the proposed model. Stanovich (1980) argued that that when readers experience problems, they switch from an insufficient knowledge source to other sources of input to help overcome these problems. This compensatory
process includes the ability to recognize inadequacies in particular knowledge sources, select alternative knowledge sources, and evaluate selections of alternative knowledge sources against the purposes and plans for reading. This ability, or strategic knowledge, requires readers to use cognitive and metacognitive reading comprehension strategies. Therefore, strategic knowledge in the proposed model encompasses the conscious cognitive and metacognitive mental actions readers take to plan, repair, evaluate, and monitor comprehension processes (Baker and Brown, 1984).

2.1.5. Strategic knowledge and reading comprehension

Over the years, qualitative studies investigating the reading strategy use of proficient and less-proficient L2 readers (defined in terms of either L2 reading scores or L2 proficiency) have indicated that these two groups differ in strategic behaviors. For example, Ikeda and Takeuchi (2006) highlighted the differences in the use of strategic knowledge among the proficient and less-proficient L2 readers in their study. Examining the journal entries of 10 Japanese university EFL readers regarding strategy use (5 proficient L2 readers and 5 less-proficient L2 readers), Ikeda and Takeuchi found that these two groups differed in six main ways. The researchers noted that the proficient L2 readers used more strategies, better understood the purposes of strategies and when to use them, used more combinations of strategies, and better knew how and when to evaluate strategy use when compared to the less-proficient readers. The findings here corroborate other studies (e.g., Block, 1986, 1992; Jimenez et al., 1996; Sheorey and Mokhtari, 2001) in that proficient L2 readers apply more effectively their strategic knowledge than less-proficient L2 readers.

In addition to these studies, a small body of research employing advanced statistical techniques makes transparent the influence of strategic knowledge on reading comprehension. For example, Phakiti (2003, 2008) carried out two large-scale studies examining the relationship between cognitive and metacognitive strategy use and L2 reading comprehension. In the first study, Phakiti collected questionnaire data from 384 Thai university EFL students to measure cognitive and metacognitive strategy use and multiple-choice questions and gap-fill tasks to measure L2 reading comprehension. Then, using in-class performance from English courses as indices, students were ranked into high, intermediate, and low groups. The results showed that metacognitive and cognitive strategies were moderately correlated (r = .61), and that the combinations of these two strategy types accounted for 15%—22% of L2 reading performance. Additionally, MANOVA analyses comparing cognitive and metacognitive strategy use between the high, intermediate, and low groups were significantly different, showing that the more successful groups used higher quantities of strategies.

In his second study, Phakiti (2008) found that cognitive and metacognitive strategy use accounted for slightly more second language reading variance than in the first study. Data came from 561 Thai university EFL students. Two different tests were given for L2 reading, and a strategy questionnaire was used to measure cognitive and metacognitive strategy use. Using structural equation modeling, Phakiti found, similar to his first study, that cognitive and metacognitive strategies are highly intercorrelated, and that these strategies explained between 11% and 30% of L2 reading performance. Regarding strategy use among readers of different proficiency levels, Phakiti noted that “more successful test-takers reported higher awareness of state and trait cognitive and metacognitive strategy use than less successful ones” (p. 259). While the findings from these two studies must be interpreted cautiously due to the problematic nature of self-reported strategy data, these studies show that strategic knowledge contributes to L2 reading and that higher-level readers use strategies more effectively.

While Phakiti’s studies quantify the contributions of strategic knowledge in L2 reading, questions remain regarding how well strategic knowledge predicts L2 reading when investigated alongside L2 language knowledge and L1 reading ability. Two studies from the Netherlands provide insight into this area. First, Schoonen et al. (1998) investigated how vocabulary knowledge and metacognitive knowledge explain both L1 and L2 reading comprehension. Additionally, the researchers investigated how the relationship between L1 reading and L2 reading is mediated by these two variables. The participants of the study were 416 Dutch, EFL sixth, eighth, and tenth graders. Schoonen et al. measured metacognitive knowledge with a test and operationalized its constructs as: assessment of oneself as a reader, reading goals and comprehension criteria, knowledge of text characteristics, and knowledge of reading strategies. The researchers also used multiple-choice reading tests in both Dutch and English, and obtained vocabulary measures through translation (L2 vocabulary) and multiple-choice questions (L1 vocabulary). Using covariance structure analyses, Schoonen et al. found that for L1 reading at grade 6, L1 vocabulary knowledge explained 60% of reading comprehension, while metacognition explained 4%. At grade 10, L1 vocabulary’s role weakened, explaining 48% of reading performance and metacognition played a larger role, accounting for 17% of reading comprehension scores. For L2 reading, at grade 8, L2 vocabulary explained 71% of reading comprehension,
whereas metacognition explained 5%. In grade 10, however, 35% of reading scores were attributed to L2 vocabulary and 25% to metacognition. Regarding the relationship between L1 and L2 reading comprehension, the results showed that L1 reading ability became a stronger predictor of L2 reading as students increased in proficiency, explaining 38% of the L2 reading scores. Schoonen et al. further analyzed the correlations between L1 and L2 reading to determine if this relationship could be explained by a language-dependent variable (L1 vocabulary knowledge) or a language-independent variable (metacognition). At grade 8, the language-dependent variable accounted for nearly all of the relationship between L1 and L2 reading (36% out of the total 37% variance). At grade 10, however, 37.9% out of 38% of the L1—L2 relationship was due to metacognitive knowledge. The findings from this study suggest that L2 vocabulary plays a stronger role than metacognition for lower-proficiency L2 readers and that this power fades as L2 proficiency increases, giving way to metacognition. Furthermore, the relationship between L1 and L2 reading can be explained by vocabulary knowledge transferring across languages for lower-proficiency students, whereas the cross-linguistic reading relationship for the higher-proficiency reader can be accounted for by metacognition shared by both languages.

A second study, van Gelderen et al. (2007), examined how language-specific factors and metacognition contribute to the development of L1 and L2 reading. The researchers collected data from 397 Dutch L1 EFL students for three years (grades 8–10). The researchers recorded multiple measures of word recognition, processing speed, vocabulary, grammar, and reading comprehension in Dutch (L1) and English (L2). Metacognitive knowledge was measured by a 54-item test regarding reading and writing strategies and knowledge of text structures. Multiple models were produced from the data using structural equation modeling. The first structural model showed that metacognitive knowledge explained a large portion of reading performance in both languages in grade 8 (43% L1, 41% L2) and strengthened in predictive power in subsequent years, explaining up to 72% of the L2 reading score variance. Additional models for each language-specific variable (i.e., vocabulary, word recognition, sentence verification, grammar) were computed to examine if these variables could predict reading performance in both languages in addition to the metacognitive knowledge effects found in the first model. The results suggest that L2 language is a better predictor of second language reading at grade 8 than metacognition. For instance, L2 grammar alone explained more variance (i.e., 49%) than metacognition at this grade. However, the results also showed that the strength of the language-specific variables weakened over time. For example, vocabulary, grammar, and word recognition were significant predictors of L2 reading comprehension in grade 8, but they were not significant predictors in grades 9 or 10. Furthermore, sentence verification was a significant predictor of second language reading comprehension in grades 8 and 9 but not in grade 10. Similar patterns were observed in L1 reading—language-specific variables weakened in predictive strength over time, and metacognition became a stronger predictor of reading comprehension. Because metacognitive knowledge contributed to both L1 and L2 reading comprehension beyond the language-specific variables, van Gelderen et al. concluded that metacognitive knowledge is best regarded as a language-independent construct; a knowledge source that contributes to reading in both languages. Therefore, while metacognition, or strategic knowledge, overlaps with the L1 literacy component in the original CM, it is more accurately conceptualized and studied as a separate component.

2.1.6. Placement in the proposed model

Two clear trends emerged from the reading strategy literature reviewed in this section. First, strategic knowledge explains between 11% and 72% of L2 reading performance. Discrepancies in the amounts of explained variance is likely due to differences in: research instruments (e.g., self-reported strategy questionnaires vs. performance-based strategy tests), L1 language backgrounds of participants, and L2 proficiency levels. Nonetheless, these studies suggest that a strategic knowledge component can help account for some of the unexplained variance in the current compensatory model (Bernhardt, 2005), which is reflected in Fig. 2. Second, qualitative and quantitative studies show that proficient L2 readers make better use of their strategic knowledge than less-proficient ones. Therefore, in the proposed model, the contributions of strategic knowledge are greater for students at higher levels of L2 development. Although uses of strategic knowledge between proficient and less-proficient readers is clear, determining the relative contributions of strategic knowledge to L2 reading compared to L2 language knowledge and L1 reading ability components is not.

In regards to L2 language knowledge and strategic knowledge, Schoonen et al. (1998) and van Gelderen et al. (2007) found similar patterns—L2 language knowledge explained more variance in the L2 reading scores of low-proficiency L2 readers than metacognition. This is reflected in the proposed model (see Fig. 2). Additionally, the
model predicts the opposite for higher-proficiency L2 readers, since these studies reported that strategic knowledge is a stronger contributor than L2 language knowledge for these readers.

What is most difficult to explain, however, is whether strategic knowledge or L1 reading ability is a better predictor of L2 reading performance. Previous studies investigating the Linguistic Interdependence (Cummins, 1979) and Short-Circuit (Clarke, 1980) hypotheses discussed earlier generally assumed that strategies were transferring from L1 to L2 reading, and that is why L1 reading ability was a stronger predictor of L2 reading performance for higher-proficiency readers in those studies. However, the studies by van Gelderen et al. (2007) and Schoonen et al. (1998) provide evidence that L1 language variables and metacognition help explain the relationship between L1 and L2 reading. These studies showed that much of the shared variance between L1 and L2 reading for low-proficiency L2 readers is accounted for by language-related L1 variables. Thus, in the proposed model, L1 reading ability is shown to be a stronger component compared to strategic knowledge for these readers. Whereas the predictive power of L1 reading increases as readers advance in proficiency levels (as shown in Fig. 1), a considerable amount of this relationship was explained in van Gelderen et al. and Schoonen et al. by metacognitive knowledge, a language-independent factor. Therefore, in Fig. 2, strategic knowledge subsumes some of the variance accounted for by L1 reading ability, making strategic knowledge the strongest predictor for higher-proficiency second language readers.

2.1.7. Predicting the contributions of background knowledge to L2 reading

Although the term background knowledge can refer to content or formal schema (Carrell, 1983), background knowledge in the proposed model relates to the former; consisting of the domain, topical, or cultural knowledge readers bring to texts. Previous L2 reading models included background knowledge components, such as Coady (1979) and Bernhardt (1991). In Bernhardt’s later models (2000, 2005) this component was excluded. Bernhardt (2005) explained that psycholinguistic notions of reading, such as those endorsed by schema theory, did not accurately capture the reading processes of L2 readers. Her data, for example, showed that “readers sometimes used the background knowledge they had, and sometimes they did not. In some cases, it appeared that readers had no background knowledge, and, nevertheless, achieved a high-level of comprehension” (p. 135). Indeed, such findings are difficult to explain from schema theoretic perspectives, which suggest that “if readers do not have the appropriate schema… comprehension will simply fail” (Nassaji, 2007, p. 83). Current theories, however, explain the role of background knowledge differently.

Recently, Nassaji (2007) discussed at length the role of background knowledge in non-problematic, automatic comprehension. Using Kintsch’s (1998) construction-integration model for theoretical support, Nassaji argued that background knowledge is most involved in the second stage of a two-part comprehension process. In the first, most important stage, lower-level processes, such as those included in quick and accurate letter and word recognition, work to extract the propositional meaning from texts, constructing a textbase. The primary role of background knowledge is in the second, integration stage of comprehension, where the textbase is fused with the reader’s knowledge, creating a mental model of comprehension. Nassaji explained that although all readers benefit from having relevant
background knowledge, text-level comprehension scores for those with high L2 proficiency may not show strong
effects from background knowledge because these readers can construct textbase meaning with language-based skills.
From this position, L2 language ability is clearly a stronger predictor of comprehension than background knowledge.

While Nassaji (2007) described the role of background knowledge in comprehension during automatic text pro-
cessing, he also pointed out that background knowledge can be used strategically during textbase construction. To this
point, Stanovich (1980) explained that a “compensatory conception allows for the reader with poor letter or word
recognition skills to draw heavily on higher-level knowledge sources” (p. 48). The proposed model draws from the
literature to reflect the influence of background knowledge in both capacities.

2.1.8. Background knowledge and reading comprehension

The findings from a number of studies suggest that background knowledge plays a compensatory role in L2
reading. For example, Chan (2003) investigated the effects of cultural background knowledge on reading compre-
hension. The participants, 214 Chinese EFL university students, were divided into intermediate and post-intermediate
proficiency groups. Chan found that background knowledge significantly affected the intermediate group only; post-
intermediate L2 readers did not score significantly better when reading culturally familiar texts. Al-Shumaimeri’s
(2006) findings also imply that background knowledge functions as a compensatory resource. Al-Shumaimeri
examined the influence of background knowledge for high and low-proficiency Saudi Arabian university EFL
readers. The results showed that high-proficiency readers scored statistically similarly on reading tests regardless of
whether they had high levels of background knowledge or not. Conversely, students with low L2 proficiency scored
significantly better on reading tests when they had high levels of background knowledge. These findings and others
(e.g., Hudson, 1982; Lesser, 2007) suggest that background knowledge compensates for deficiencies in language
ability.

Other studies examining the interrelationships between background knowledge and text processing provide insight
into the ways background knowledge functions as a compensatory resource. For instance, Barry and Lazarte (1995)
demonstrated that groups of English L1, Spanish L2 students possessing high domain knowledge of L2 texts were able
to delay the negative effects of increased syntactical complexity on propositional recall when compared to the low
knowledge group. Data showed that the high knowledge group maintained a significant advantage over the low
knowledge group for advances in two levels of syntactic complexity. At the third level, the positive effect of back-
ground knowledge weakened. These findings suggest that background knowledge can help readers deal with more
linguistically demanding texts. In a follow-up study, Barry and Lazarte (1998) investigated the influence of back-
ground knowledge and syntactic complexity on the amounts and types of inferences readers make. They found that
increased levels of syntactic complexity prompted readers to make significantly more inferences. Readers with high
background knowledge made substantially fewer incorrect inferences than the low background knowledge group, and
they made significantly more within-text inferences than the low group. The researchers suggested that high back-
ground knowledge readers switch to knowledge-driven processing when confronted with linguistically demanding
texts. Thus, these studies imply that background knowledge serves as a compensatory source when L2 readers face
linguistic difficulties.

While Barry and Lazarte (1998) highlight the importance of background knowledge in accurate inferencing, other
studies show that background knowledge positively influences accuracy and efficiency at the word level. For example,
Chen and Donin (1997) examined the effects of language proficiency and background knowledge on reading recall
and speed for 40 Chinese EFL university students. Results from MANOVA analyses showed that students with high
background knowledge read significantly faster than students with low background knowledge. Furthermore, L2
proficiency significantly impacted reading times for participants with low-proficiency and low background knowl-
edge, whereas L2 proficiency did not significantly impact reading times for students with high background knowledge
and low-proficiency. In addition to reading significantly faster, students with high levels of background knowledge
recalled significantly more idea units than low background knowledge students. When comparing data between low-
proficiency students with low and high levels of background knowledge, the high background knowledge group
outperformed the low group on every measure of recall and reading speed. Chen and Donin explained that “high
[background] knowledge readers with less L2 proficiency could read as quickly as those low [background] knowledge
readers with more proficiency” (p. 220). This study suggests that background knowledge facilitates lower-level
processing.
Droop and Verhoeven (1998) also provide evidence that background knowledge supports text processing. They investigated the impact of cultural background knowledge on reading comprehension and reading efficiency for Dutch L1 and Dutch L2 third-grade students. The participants read linguistically simple and linguistically complex texts related to three background conditions: texts that were culturally neutral, texts that reflected Dutch culture, and texts that reflected the culture of the L2 students. The researchers found that background knowledge influenced reading comprehension and reading efficiency for both groups of learners. However, although background knowledge facilitated reading efficiency for the Dutch L2 students for both linguistically simple and linguistically complex texts, statistical significance was found for the linguistically simple texts only. This study indicates that background knowledge influences lower-level processing, but increased linguistic complexity can override those positive effects.

Studies utilizing regression analyses identify the possible limits of background knowledge effects, while also providing important information regarding the relative contributions of language knowledge and background knowledge to L2 reading. Clapham (1996), for example, collected data from 842 university English language learners in order to determine the effects of discipline-specific background knowledge on reading performance. After dividing the participants into three proficiency groups based on the results of a grammar test, Clapham found that background knowledge had little effect on readers at the highest (i.e., grammar scores above 80%) and lowest (i.e., grammar scores below 60%) levels of proficiency. Moreover, Clapham computed multiple regression models to determine the contributions of L2 language knowledge and background knowledge and found that for subject-specific texts, L2 language knowledge accounted for 26% of the L2 reading variance, while background knowledge accounted for 12%. This study shows that language knowledge is a stronger predictor of L2 reading than background knowledge and that the positive effects of background knowledge may be limited.

Similar to Clapham (1996), Tan (1990) examined the contributions of L2 language knowledge and background knowledge to L2 reading. Tan collected data from Malaysian university EFL learners and found that both variables were significant predictors of second language reading, although L2 language knowledge accounted for nearly double the variance in reading scores than background knowledge. Consistent with these findings, Uso-Juan (2006) reported that L2 language knowledge explains roughly twice as much variance in reading compared to background knowledge. Her study also demonstrates how background knowledge compensates for deficiencies in language knowledge. After collecting scores for L2 proficiency, background knowledge, and six reading comprehension tests, Uso-Juan found that for the 94 university Spanish students in her study, both background knowledge and L2 proficiency significantly predicted reading achievement. Of these two influential variables, Uso-Juan discovered that L2 proficiency accounted for more reading comprehension variance (58–65%) than background knowledge (21–31%). With further analyses, Uso-Juan found that readers with high and intermediate levels of L2 proficiency could comprehend texts even when they did not possess any measurable discipline-related knowledge. On the other hand, low-proficiency readers needed to have both high levels of discipline knowledge and a minimum level of L2 proficiency for successful comprehension. This study suggests that L2 proficiency is a stronger variable than background knowledge in L2 reading, and that the effects of background knowledge cannot overcome extreme deficiencies in proficiency.

2.1.9. Placement in the proposed model

The literature reviewed above shows two main trends. First, background knowledge can have a significant impact on L2 reading comprehension, accounting for up to 31% of reading score variance. Therefore, like strategic knowledge, background knowledge may help account for unexplained variance in the CM (Bernhardt, 2005). Second, the impact of background knowledge is different for readers at different L2 proficiency levels. For readers with low L2 proficiency, it appears that background knowledge helps reading efficiency and comprehension, although this effect is negated at the lowest levels of proficiency. At high levels of L2 proficiency, background knowledge can help readers comprehend, but it does not seem to be a major predictor of reading performance. Considering these two trends, background knowledge in the proposed model plays a larger role for the lower-proficiency L2 reader than for the higher-proficiency reader, and L2 language knowledge is a better predictor of reading performance than background knowledge for L2 readers at both proficiency levels.

When comparing the contributions of background knowledge to L1 reading ability and strategic knowledge, it is important to recall that background knowledge functions in both strategic and automatic processing (Nassaji, 2007). Studies show that background knowledge is used strategically in L2 reading (e.g., Anderson, 1991; Sheorey and Mokhtari, 2001), but when applied in a conscious manner to construct meaning, background knowledge would be subsumed in the strategic knowledge component of the proposed model. However, considering that these studies
report that the conscious application of background knowledge was one of many strategies employed during reading, it is unlikely that the effects of background knowledge on comprehension are explained fully by this strategic function. This suggests that the influence of background knowledge might be attributed to its effects during automatic processing. In automatic processing, background knowledge plays important roles in mental model comprehension (Barry and Lazarte, 1998) and facilitates lower-level processes, indicated by increased reading speeds (e.g., Droop and Verhoeven, 1998). Since literature in earlier sections demonstrated that L1 reading ability and strategic knowledge were relatively weak predictors of L2 reading for lower-proficiency readers, and studies presented in the current section show that background knowledge can significantly impact reading comprehension for some low-proficiency readers, background knowledge is a stronger predictor than L1 reading ability and strategic knowledge for this population (see Fig. 3). However, considering that both strategic knowledge and L1 reading ability increase in their predictive powers as readers become more proficient and background knowledge lessens, background knowledge is weaker than these two components for higher-proficiency L2 readers.

3. The proposed model

Based on a synthesis of the literature reviewed above, the model in Fig. 3 depicts the contributions to second language reading of L2 language knowledge, L1 reading ability, strategic knowledge, and background knowledge at two stages of L2 development. Since studies in second language reading research have used different instruments and operationalizations of L2 proficiency, the labels of lower and higher are not absolute terms. However, as a general guideline, Bachman (2004) proposed that it is possible to define lower and higher groups by administering a proficiency test to a large, normally distributed sample. Then, after dividing the sample into thirds, the middle 33% is excluded, leaving the bottom and top 33% of the sample to represent the lower and higher-L2 proficiency groups, respectively (see Pichette et al., 2003). The model’s predictive power lies in the relative size of the components within each pie for the lower-and higher-proficiency reader. That is, the largest section represents the component that most strongly influences reading comprehension, while the least influential component is represented by the smallest section. Therefore, listing the relative contributions of the components from largest to smallest, the model predicts the order for the lower-proficiency reader to be L2 language knowledge, background knowledge, L1 reading ability, and strategic knowledge, whereas strategic knowledge, L2 language knowledge, L1 reading ability, and background knowledge are the predictions for the higher-proficiency L2 reader.

4. Researching the model

Because the proposed model predicts the contributions of four components to L2 reading comprehension, regression analyses offer one way to falsify the model. More specifically, early investigations of the model can use exploratory multiple regression analysis in order to verify the strengths of the contributions proposed by the model. In later investigations of the model, hierarchical multiple regression could be employed, with separate analyses.

Fig. 3. Predicting the relative contributions of L2 language knowledge, L1 reading ability, strategic knowledge, and background knowledge to L2 reading.
computed for both the lower and higher-L2 proficiency groups. Hierarchical multiple regression analysis provides researchers with the opportunity to control the order in which variables are entered into regression equations, based on theoretical models (Sheskin, 2007). Using this technique, researchers would enter variables for analyses based on the predictions of the proposed model.

Collectively examining the contributions of these four components will help shed light on critical questions in the field of L2 reading. Current topics of discussion revolving around linguistic thresholds, schema theory, common underlying proficiencies, and processing efficiency suggest that second language reading is a multifaceted cognitive process that encompasses linguistic and knowledge-based sources. Embedded within each of these topics are assumptions regarding the ways L2 readers draw from knowledge sources as they construct meaning from written texts. However, while the field has begun to examine through the use of regression analyses how certain factors account for reading performance, it has not fully studied how these factors operate at different times in L2 development. For example, studies investigating the contributions of L2 language knowledge and L1 reading ability (e.g., Bernhardt and Kamil, 1995), strategic knowledge (e.g., Phakiti, 2003), and background knowledge (e.g., Uso-Juan, 2006) computed composite estimates for the contributions of these variables. In other words, even though research has suggested that these four variables function differently for readers at low and high levels of L2 proficiency, the field has examined the contributions of these variables holistically, with one score representing these variables for both groups. Researching the proposed model will facilitate investigations that treat these groups separately.

In addition to uncovering the contributions of variables at two stages in L2 development, researching the proposed model will help address other issues. For example, reviewing the literature for the proposed model uncovered gaps regarding: the operationalization of the L1 reading ability variable; the relationship between strategic knowledge and the effects of background knowledge on reading comprehension; the amount of L2 reading variance accounted for by L1 reading ability beyond the contributions of strategic knowledge; contributions of L1 reading ability to L2 reading from languages that are linguistically similar and different; the predictive strength of L2 language knowledge variables besides grammar and vocabulary knowledge; the contributions of background knowledge to reading comprehension for both cultural and discipline-related knowledge; differences in the contributions of strategic knowledge-based upon on-line strategy use (e.g., through think-aloud protocols) as opposed to self-reported strategy use. By investigating how four components explain L2 reading, we will have a deeper understanding of these issues.

During the process of testing the proposed model, researchers need to accurately describe the conditions under which the model is being tested. The literature shows that testing times and tasks matter. For example, studies in L1 reading research (e.g., Walczyk et al., 2007) have shown that compensatory processes occur more readily for tasks with longer completion times, whereas language-based processes more strongly affect comprehension under strict time pressures. This has direct implications on the proposed model concerning the predictions of L2 language knowledge and strategic knowledge. Furthermore, the types of reading tasks participants complete in L1 and L2 reading will impact results. Oxford et al. (2004) found that task difficulty affects strategy use. For example, when completing easy reading tasks, there were few differences in strategic behaviors between high and low-proficiency readers. However, when faced with more difficult tasks, noticeable differences in strategy use between the groups appeared. These findings corroborate Taillefer’s (1996), who, in her study, found that the amounts of explained L2 reading performance attributed to L1 reading ability differed for different tasks. With regression analyses and other techniques such as structural equation modeling becoming more prevalent in L2 reading research, researchers need to be mindful and adequately document the testing conditions from which their findings derive because these conditions hold important information for future model development.

5. Conclusion

Views of second language reading have changed over time and more changes will undoubtedly take place. Because L2 reading is understood as a sophisticated process entailing a number of factors, models should represent this sophistication, multidimensionality, and interactivity. While the L2 compensatory model (Bernhardt, 2005) explains a significant portion of L2 reading, much is left to be determined. By adding to this model the components of strategic knowledge and background knowledge, the goal of this new extended model is to better capture the second language reading process and predict how factors affect it. With this goal, the proposed extended compensatory model offers a foundation for research investigating the interplay of L2 language knowledge, L1 reading ability, strategic
knowledge, and background knowledge in second language reading and a starting point for a future extension to the affective, social, and political pieces that likely also matter.

Acknowledgments

This paper was supported by the Sookmyung Women’s University Research Grants 2011. I would like to express my gratitude to the editors and anonymous reviewers for their valuable comments.

References


