Linguistic Predictors of L2 Reading Growth

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Abstract

The present study sought to better understand the predictive relationship between L2 skills—listening, speaking, and writing—and reading growth across a semester. A multiple regression analysis showed that reading growth, as measured by the difference between end-of-semester achievement test performance and beginning-of-semester placement test performance, was predicted by placement test performance in the three other skills. These results further highlight the connections across language skills, and especially between reading and writing: initial writing performance was shown to individually account for the greatest amount of variance (10%) in L2 reading growth. When weak readers, specifically, were isolated for investigation, initial performance in writing, speaking, and listening no longer predicted reading growth in a statistically significant way. These results could be interpreted as further evidence for the distinction between reading ability and language ability. Readers rely, in inconsistent amounts, on both language ability (in the L2) and general reading ability (as transferred from the L1) to successfully interpret the texts they read (Grabe, 2009). The weak readers' poor performance on the placement exam could be the consequence of reading-specific deficits, which are uninfluenced by language strengths in other areas.

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Background

Much is known about the successful second-language (L2) reader. She applies phonological, morphological, and orthographic knowledge as she reads, allowing her to decode words automatically and effortlessly and preserve cognitive energy for higher-level processes like main idea comprehension (e.g., Grabe, 2009; Nassaji, 2014). She has a vast receptive vocabulary, of at least 35,000 to 40,000 words, facilitating enough vocabulary coverage (i.e., 98-99%) to adequately comprehend academic texts (Schmitt, 2008). She reads strategically (e.g., Duke et al., 2011), extensively (e.g., Suk, 2017), and with high levels of intrinsic motivation (e.g., Grabe, 2009).

Recent L2 reading studies have attempted to elucidate the characteristics that distinguish skilled from weak readers. Individual differences across domain-*general* cognitive skills (e.g., working memory capacity) and domain-*specific* skills (e.g, word-recognition and lexical retrieval) explain some variation in L2 reading ability (Alderson et al., 2015). Contextual factors like socioeconomic status, which can impact the quantity of text to which readers have access, can also predict differences in reading skills (Alderson et al., 2015; Grabe, 2009). L1-related factors—such as L1-related skills or varying levels of orthographic depth across languages—may also account for some differences in L2 reading ability (Alderson et al., 2015; Sparks et al., 2009), although morphological and syntactic awareness relate to reading comprehension across a variety of distinct L1s, including English, French, and Chinese (Tong & Deacon, 2017).

Other studies have examined relationships between reading comprehension and other language skills, such as listening, speaking, and writing. Phonological awareness—or the ability to deconstruct words (spoken or written) into their smaller sound units—underlies both the decoding processes necessary for reading (e.g., Nassaji, 2014), as well as general listening comprehension. Strong listening skills, then, may influence quicker improvement in reading. Indeed, Farnia & Geva (2013) found that listening comprehension predicts reading comprehension in elementary-school aged children; on the other hand, in their meta-analysis, Jeon & Yamashita (2014) uncovered only weak evidence to support the relationship between L2 reading and listening comprehension. The few studies that have explored connections between reading and *speaking* performance have produced varied conclusions. Babayiğit (2014) found oral language ability to be a powerful predictor of reading comprehension; however, Spencer and Wagner (2017) determined in their study that, although children with weak reading skills were also found to be poor speakers, the deficits in their oral skills were not substantial enough to explain their poor reading comprehension. Reading and writing are often linked and conflated within a larger "literacy" category. In academic contexts, reading and writing assignments are typically integrated—e.g., a reader demonstrates comprehension of a text or texts by producing a summary or synthesis (Grabe, 2009)—suggesting a symbiotic relationship between reading and writing success.

The present study aims to add to the field of L2 academic reading by examining questions and targeting populations largely neglected by current literature. For instance, although many studies have sought to explain predictive relationships between reading comprehension and other skills—such as listening comprehension and speaking—fewer studies isolate the way in which these skills predict and relate to *change* in reading performance over time.

Additionally, reading performance in children, specifically, has been the focus of many of these studies (e.g., Sparks et al., 2009; Spencer & Wagner, 2017). Because relationships between reading comprehension and other cognitive and linguistic skills have been found to change according to participant age and proficiency level (Farnia & Geva, 2013), conclusions from these studies may not be generalizable to other (i.e., older and more proficient) populations. Adult readers in academic contexts, especially—for whose success efficient, independent reading of advanced material is essential (e.g., Wolf & Stoller, in press)—may face particularly severe consequences if they read poorly. A deeper understanding of the differences between weak and strong academic readers could help reading instructors better manage their expectations of a multi-level class or inspire the development of language-learning materials that cultivate in (poor) readers the kind of linguistic and cognitive skills associated with reading growth

Research Questions

Two research questions guided the present investigation:

1. To what extent can reading growth across a semester of study be predicted by initial performance in listening, speaking, and writing?
2. Does the predictive relationship change when initially weak readers are isolated?

Methods

Context

Participant data were collected from the Program in Intensive English (PIE) at Northern Arizona University. The PIE boasts a robust assessment program: a full-time Assistant Director of Assessment oversees a small team of test developers, who collaborate with full-team teaching faculty to develop two achievement tests per semester for each level (3-6) of two core classes: (1) Listening and Speaking, and (2) Reading and Writing/Vocabulary. These achievement

tests—administered during weeks eight and fifteen of a sixteen-week semester—are criterion-referenced, aiming to evaluate student comprehension of level-appropriate content as determined by curricular Student Learning Objectives. The assessment team also reviews and revises a long-standing normative placement test—of all four skills—which is taken by students new to the PIE to determine their starting level. Averages across the four skill sections are calculated; students take all their PIE courses at one level, even if the placement test suggested varying ability across skills.

The present investigation included test data from students (N = 159) who entered the PIE during the fall semesters of 2013-2017 and whose performance on the placement test qualified them for Level 5 (i.e., high-intermediate courses). As an academic-English program designed to prepare students for subsequent university matriculation at the undergraduate level, the PIE typically has more students in Level 5 than any other level; thus, a considerable amount of data is available for examination. Though some new testlets of the Level 5 achievement test are introduced each semester, the test specifications remain the same (e.g., included passages are 500-650 words; all passages have a Lexile difficulty of 975-1125L). The consistency of test specifications allows for combining test takers into a single participant group, even across disparate semesters.

Participants

A total of 159 participants—in both placement and reading achievement tests—were collected for investigation. Descriptive statistics for these test-takers can be found in Table 1; all test scores have been scaled to 50 points to better allow comparability.

Table 1

Descriptive Statistics: All Test-Takers

Measure	Mean (SD)
Placement Test: Listening	27.89 (4.56)
Placement Test: Speaking	26.82 (5.22)
Placement Test: Writing	24.28 (4.11)
Placement Test: Reading	28.51 (5.58)
Achievement Test: Reading	35.45 (6.64)
Reading Growth	6.94 (8.05)

Growth in reading performance was calculated as the difference between achievement test and placement scores in reading. Although the two test types are designed for different purposes (i.e., to determine level versus to evaluate achievement), and thus intended to be distinct in terms of average item difficulty, all students took the two tests according to the same specifications. For this reason, it is acceptable to compare growth by calculating difference in performance across the tests. The high standard deviation for reading growth suggests, surprisingly, that the reading achievement test was more difficult for many students than the initial placement test.

Results

Assumptions for a multiple regression analysis were checked. A review of bivariate relationships across independent variables found no correlations greater than .90, no tolerance values below .40, and no VIF values above 2.50: this indicates that the data meet the required assumption of absence of multicollinearity. Independence of errors was verified via a calculation of the Durbin-Watson value; at 2.269, this value falls within an acceptable range. Data were visually inspected using a scatterplot of the residuals (Figure 1) and found to be reasonably normal, linear, and homoscedastic. Finally, Mahalanobis distance was found to be well below the

critical value (α = .05) for three independent variables, indicating that there exist no multivariate outliers.

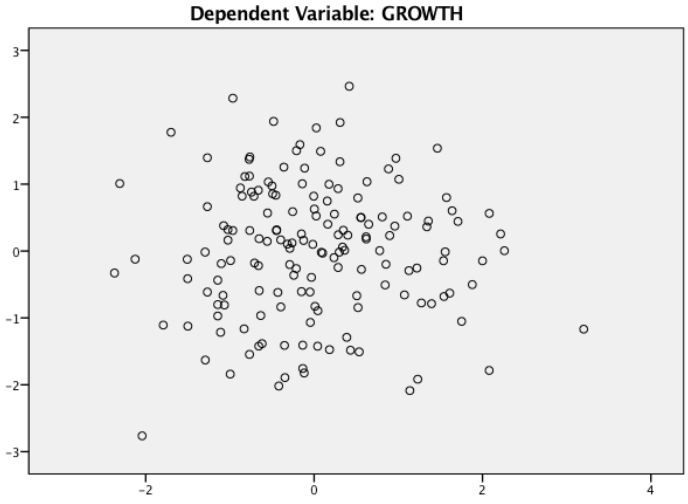

Figure 1. *Residual scatterplot.*

Next, a stepwise multiple regression analysis—appropriate for an exploratory investigation—was run (Table 2). Each of the independent variables—initial writing, speaking, and listening—explains a significant (p <.05) amount of individual variance to the model after the previous variables have been entered. Together, the placement performance in these three skills accounts for 18% of variance in L2 reading growth. Individually, initial writing performance, accounting for roughly 10% of variance, was the greatest contributor to the model.

Table 2

Multiple Regression Analysis Results

Model	R^2	Adjusted R^2	R^2 change	F change	Sig. F change
Writing – Placement Score	.104	.098	.104	18.244	.000*
Writing & Speaking – Placement Scores	.151	.14	.047	8.562	.004*
Writing, Speaking, & Listening – Placement Scores	.180	.164	.029	5.525	.020*

*α = .001

An ANOVA (Table 3) confirmed the significance of the model: $F(3, 155) = 11.337$, $p < .001$, $R^2 = .18$.

Table 3

ANOVA Results

Model		df	Mean Square	F	Sig.
Writing – Placement Score	Regression	1	1064.446	18.244	.000*
	Residual	157	58.345		
	Total	158			
Writing & Speaking – Placement Scores	Regression	2	770.507	13.842	.000*
	Residual	156	55.664		
	Total	158			
Writing, Speaking, & Listening – Placement Scores	Regression	3	613.298	11.337	.000*
	Residual	155	54.095		
	Total	158			

*$\alpha = .001$

To address the second research question, weak readers, specifically, were isolated for analysis. In related studies, weak readers have been those who performed one standard deviation below the mean on a reading comprehension test (e.g., Alderson et al., 2015; Palladino et al., 2001). However, per these criteria, only 29 of the 159 students qualify as weak readers, which is too small a sample size for a multiple regression analysis; for an analysis with three predictor variables, at least 45 observations (i.e., 15*k*) are needed (Stevens, 1996). To increase the sample size, weak readers were redefined as those who performed at least one-half standard deviations below the mean; these new parameters included 53 readers total (Table 4).

Table 4

Descriptive Statistics: Initially Low-Performing Readers

Measure	Mean (SD)
Placement Test: Listening	29.66 (3.93)
Placement Test: Speaking	29.21 (5.61)
Placement Test: Writing	25.35 (3.79)
Placement Test: Reading	22.35 (2.23)
Achievement Test: Reading	34.85 (6.33)
Reading Growth	12.50 (6.13)

Although these data were also found to meet all required assumptions of a multiple regression analysis (i.e., absence of multicollinearity; independence of errors; normality, linearity, and homoscedascity; and absence of outliers), no variables met criteria for inclusion in the model during SPSS analysis. A standard regression analysis confirmed the lack of a significant relationship (p = .782) between the independent and dependent variables.

Relevance to PIE and Second-Language Learning

Reading in a critical skill in academic contexts. Intensive English Programs like the PIE, which intend to prepare students for the demands of future reading-intensive university courses, should prioritize investigations of L2 reading growth. By better understanding possible (linguistic) influences on reading development, the PIE can aim to identify and prepare for—and, possibly, maximize—the impact of these influences.

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