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Moving Towards Biliteracy: Varying Paths of Bilingual Writers in Two-Way Immersion Programs

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MOVING TOWARDS BILITERACY: VARYING PATHS OF BILINGUAL WRITERS IN TWO-WAY IMMERSION PROGRAMS

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Abstract:
This study investigates the English and Spanish lower-order writing development of 185 bilingual students in two-way immersion (TWI) programs and explores the extent to which home language exposure may explain different writing trajectories in each language. Students were administered English and Spanish basic writing skills assessments once

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per year over four years, from second through fifth grade. Multi-level modeling revealed that students demonstrated significant growth in lower-order writing ability in both languages, but the rates of acceleration slowed over time. Moreover, increased use of a given language at home was significantly associated with higher writing ability in that language in 5th grade. However in English, students with higher levels of Spanish exposure at home exhibited a faster growth rate, thus approaching the performance of those with more English exposure at home.

Keywords: Biliteracy, Two-way immersion, Writing development, Home language, Growth modeling

Resumen:
Este estudio investiga el desarrollo de las destrezas básicas de escritura en inglés y en español de 185 alumnos bilingües matriculados en programas de inmersión recíproca, y explora el grado en que la exposición al idioma materno explica las diferentes trayectorias de escritura en cada idioma. Se administraron evaluaciones de destrezas básicas de escritura en inglés y en español una vez al año por cuatro años, a partir de segundo grado hasta quinto grado. Los modelos de crecimiento revelaron que los estudiantes demostraron un crecimiento significativo en la capacidad de destrezas básicas de escritura en los dos idiomas, pero las tasas de aceleración se reducieron con el tiempo. Por otra parte, un mayor uso de una determinada lengua en el hogar se asoció significativamente con una mayor capacidad de escritura en ese idioma en quinto grado; sin embargo, en inglés, los estudiantes con niveles más altos de exposición al español en la casa mostraron una tasa de crecimiento más rápido, acercándose de este modo el rendimiento de los que tuvieron más exposición al inglés en casa.

Palabras clave: la alfabetización bilingüe, inmersión recíproca, desarrollo de la escritura, idioma del hogar, modelos de crecimiento.

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1. Introduction

Writing is an essential skill for both academic success and professional advancement (Applebee, 1999; Cutler & Graham, 2008; Fitzgerald & Shanahan, 2000; Schleppegrell & Colombi, 2002; Shanahan, 2006), as well as a tool for fostering deep thinking and learning of content matter (National Commission on Writing, 2003; 2005). Increasing recognition of the importance of writing ability is reflected in its recent inclusion in mandatory standardized testing as well as its prominence in the Common Core State Standards (Mo, Kopke, Hopkins, Troia, & Olinghouse, 2014; Troia & Olinghouse, 2013).

However, according to recent results of the National Assessment of Educational Progress (NAEP) writing assessment, many U.S. students are not developing the

writing skills needed to promote their academic or professional success, as only about one quarter of students tested attained proficient or advanced levels of writing ability (NCES, 2012). For English language learners (ELLs), who do not have sufficient English proficiency to be successful in mainstream classrooms without additional supports, the results are even more concerning, as 65% of ELLs in 8th grade (the lowest grade tested in 2011) performed below the basic level, compared to only 17% of English proficient students. By 2015, it is projected that ELLs will comprise 30% of the K-12 student population in the United States (Capps et al., 2005). Not surprisingly, the National Commission on Writing (2003, 2005) cites the importance of ensuring the successful writing achievement of this growing segment of the U.S. student population.

Models of reading development posit that robust reading ability requires the mastery of both lower-order (code-based) skills and higher-order (meaning-based) abilities (Scarborough, 2001; Stanovich, 1980). Drawing on Scarborough's (2001) work on the many strands of skilled reading, Olinghouse, Wilson, and Neugebauer (2012) created guidelines for comprehensive writing instruction that incorporate both the lower-order skills of transcription and the higher-order skills of composition, together which yield skilled writing ability. Moreover, as is the case in the domain of reading (e.g. Logan, 1997; Vellutimo, Tunmer, Jaccard, & Chen, 2007), models of writing development (Berninger, et al., 1992; Berninger, Fuller, & Whitaker, 1996; McCutchen, 2000) posit that the acquisition and automaticity of lower-order skills such as spelling and punctuation precede and support the development of higher-order skills such as organization and cohesion. Given the foundational nature of these lower order skills, it is particularly important to understand how these lower-order skills develop for students who speak more than one language, as this is an area that has been less charted in writing research.

While the research base on the writing development of ELLs is limited (August & Shanahan, 2006), there are several key themes that emerge from the existing studies of children's second language writing in the U.S. and elsewhere, much of which has been summarized in two recent and comprehensive reviews (Méndez Barletta, Klinger, & Orosco, 2011; Fitzgerald, 2006). These themes include the effects of native language or home language use, the impact of language of instruction, transfer of skills between the first and second language, and developmental trends.

First, studies that have compared the writing performance of monolinguals to bilinguals have found that the performance of bilinguals lags behind that of monolinguals (Carlisle, 1989), although this gap may close over time (McClure, Mir, & Cadierno, 1993; Turnbull, Hart & Lapkin, 2003). This mirrors bilingual reading research, which has found considerable gaps in reading performance between

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ELLs and native English speakers that may close in some domains (e.g. lower-order skills such as decoding) but persist in others (e.g. higher-order skills such as comprehension) (August & Shanahan, 2006). Other studies have investigated writing performance among bilinguals with varying home language profiles and have found differing results. Caswell (2002) studied late-exit bilingual students who came from Spanish-speaking homes and found that home language support for Spanish before kindergarten resulted in higher English writing at the beginning of third grade, while Howard (2003) studied upper elementary two-way immersion (TWI) students from a range of home language environments and found that home language use was correlated with writing performance in English and Spanish, although the home language (or native language) advantage diminished over time in both languages. Studies of reading have likewise noted a correlation between home language use and literacy performance in the same language (August & Shanahan, 2006; Durgonoglu & Goldenberg, 2011).

Second, many studies have compared the writing performance of ELLs educated in bilingual programs with that of ELLs educated in monolingual English contexts (Carlisle, 1989; Carlisle & Beeman, 2000; Ferris & Politzer, 1981; Gale, McClay, Christie, & Harris, 1981) and have found that bilingually educated students produce English writing that is comparable to, if not better than, those of students educated solely in English. Moreover, Carlisle and Beeman (2000) also analyzed Spanish writing samples and noted that the bilingually educated students not only performed on par in English but also outperformed in Spanish the students who were educated solely in English. To explain such findings, the studies frequently invoked Cummins' (1991) interdependence hypothesis, which posits that students draw on their first language skills to support their second language development.

Likewise, many cross-linguistic studies that have investigated the simultaneous development of writing ability in two languages have also invoked Cummins' theories, as many such studies have reported similar writing processes (Gort, 2006; Edelsky, 1986; Homza, 1995) and outcomes (Howard, Christian, & Genesee, 2004; Caswell, 2002; Edelsky, 1982, 1986; Lanauze & Snow, 1989) across the two languages of bilingual learners. Similar cross-linguistic transfer has been found in many domains of reading, such as word reading and comprehension (August & Shanahan, 2006).

Finally, while there have been very few longitudinal writing studies with bilingual students, cross-sectional studies point to likely growth in various aspects of writing ability, such as productivity, linguistic complexity, spelling, and mechanics (Carlisle, 1989; McClure, Mir, & Cadierno, 1993). The few longitudinal writing studies with bilingual learners have confirmed this ongoing growth in writing ability

in both languages (Caswell, 2002; Howard, 2003), although there is evidence that this growth slows in the upper elementary grades (Howard, 2003). This mirrors developmental studies of reading, which have likewise found decreasing acceleration as both native English speakers and ELLs progress into the upper elementary grades (Lesaux, Rupp, & Siegel, 2007; Nakamoto, Lindsey, & Manis, 2007).

The purpose of this study is to integrate and build upon the previously mentioned areas of research by investigating the longitudinal development of lower-order (basic) English and Spanish writing skills among two-way immersion (TWI) students from a range of home language backgrounds. Specifically, the paper responds to three research questions:

1. What are the average growth trajectories for TWI students' lower-order writing skills in English and Spanish from grade 2 through grade 5?
2. Does home language input predict TWI students' initial level of lower-order writing skill in English and Spanish at 2nd grade as well as their patterns of growth from grade 2 through grade 5?
3. Does home language input predict TWI students' final level of lower-order writing skill in English and Spanish?

2. Methods

2.1. *Sample and Setting*

The sample for these analyses consisted of 185 students from four established TWI programs in the United States. Two of the programs employed a 90/10 approach, in which the majority of instruction in the primary grades was in Spanish and all students, regardless of home language use, received initial literacy instruction through Spanish only, with formal English literacy instruction added by third or fourth grade. Both of these programs were located on the West Coast. The other two programs employed a 50/50 approach, in which instruction at all grade levels was divided equally between English and Spanish. In one of these programs, which was located in the Northeast, all students received initial literacy instruction through both English and Spanish, while in the other, which was located in the Southwest, students received initial literacy instruction in their native language, with second language literacy added in second grade. Further details about the sample are provided in the Results section.

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2.2. *Data Collection and Measures*

Data were collected across four school years, starting when students were in second grade and ending when students were in fifth grade. A single wave of data was collected each winter by trained research assistants, who individually administered the Dictation (Dictado) and Proofing (Corrección de textos) subtests of the Woodcock Language Proficiency Battery-Revised (WLPB-R) in English (Woodcock, 1991) and Spanish (Woodcock & Muñoz-Sandoval, 1995). In addition, the Ravens Progressive Matrices (Raven, Raven & Court, 1998), a test of non-verbal intelligence, was individually administered by the same research assistants during the first two waves of data collection. This test was administered in either English or Spanish, per the child's preference. Finally, demographic information was collected from school records every year as well as from a questionnaire administered to parents when the students were in third grade. The questionnaire targeted information about children's schooling history; parents' birthplace, ethnicity, schooling, employment, and socioeconomic status; and home language and literacy practices. The questionnaire, which was available in both English and Spanish, was sent home with students and returned to the classroom teacher in a sealed envelope. Further information about the measures is provided below.

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2.3. *English and Spanish writing outcomes*

Woodcock Language Proficiency Battery-Revised: Basic Writing Skills/Destrezas Básicas en Escritura. Basic Writing Skills (Destrezas básicas en escritura) is a written language cluster comprising the two subtests of Dictation (Dictado) and Proofing (Corrección de textos). The cluster provides a measure of basic writing skills in general, with an emphasis on the ability to detect errors in capitalization, punctuation, spelling, and word usage. The reliability of the cluster is high for both the English form (r=.94 for age 6 and age 9) and the Spanish form (r=.86 for age 6 and .94 for age 9).

2.4. *Non-verbal intelligence*

Raven's Coloured Progressive Matrices. Raven's Coloured Progressive Matrices (CPM) is a multiple choice assessment of non-verbal intelligence in which subjects are asked to indicate which item completes a pattern on the page. In the Coloured version, the patterns are presented on a colored background to allow for greater visual discrimination, thus making the task more manageable for children, senior

citizens, or individuals with learning difficulties. The Coloured version consists of 3 sets of 12 items each, for a total possible score of 36 points. The retest reliability of the CPM for nine-year-old children is .80.

Socioeconomic status (SES). This study includes three indicators of SES, one collected from school records and the other two derived from responses to the parent questionnaire. Multiple measures of SES were used in order to allow for a more fine-tuned exploration of the potential effects of the construct, which seemed particularly important for a study focused on two-way immersion students, who frequently come from highly varying backgrounds (Howard & Sugarman, 2001).

Free or reduced price lunch eligibility (FRPL). When the students were in third grade, the schools provided project researchers with dichotomous information about participating students' free or reduced price lunch eligibility (FRPL=1, not FRPL=0).

Parent questionnaire. Two indicators of socioeconomic status were used as predictors in these analyses: 1) income, which was measured on a 0-8 scale with 0 representing $10,000 or less, and 8 representing $80,000 or more, and thus allows for more exploration of the potential effects of the upper ranges of income beyond what is known from FRPL information; and 2) mother's education, which represents the total number of years of formal education reported by the mother.

2.5. *Home language input*

Parent questionnaire. Home language input was the key predictor variable in this study, and consisted of a composite variable made up of responses to four questions on the parent questionnaire: language spoken to the child by the mother, by the father, by other adults in the home, and by children in the home. Response options were on a 5-point continuum, ranging from only English(1) through only Spanish(5), with 3 indicating equal use of both languages. The responses to these four questions were averaged to create the composite language input variable. As a result of the averaging, there were more possible values than the five original categories, and the variable was thus treated as continuous in the growth models. However, for the purpose of the descriptive statistics, student scores were rounded to the nearest home language input category for ease of interpretation.

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2.6. *Analytic Approach*

We used the Multilevel Model for Change framework (Singer & Willett, 2003) to address our focal research questions regarding the writing trajectories of bilingual students in TWI programs, as this type of exploration allows for the analysis of nested data, such as time within students in the current study. To better understand students' dual language trajectories (research question 1) we conducted two parallel analyses with two different outcomes of interest (English and Spanish lower-order writing development) by using W scores to model students' average writing growth in each language from grade 2 to grade 5. This developmental scale score is ideal for longitudinal modeling because it allows for equating scores across the different age-specific forms. Students' home language input was used as a potential predictor of the level of students' writing performance at grade 2 and pattern of students' growth trajectories over the course of four waves of data (research question 2), as well as a predictor of their level of writing at grade 5 (research question 3). While we had data on both students' home language input and home language use, these variables were so highly correlated ($r=.92$, $p<.0001$) that we only included home language input in the model to avoid issues of colinearity. Home language input was centered at its lowest possible true value, that is, a home language input score of 1, which represents students from homes where only English is spoken. All control variables at the student-level were centered at their grand means.

Before beginning our model building process, we explored the individual student empirical growth plots. These provided support for a curvilinear relationship for lower-order writing development in both languages; that is, students' lower-order writing ability appeared to grow over time, but not as quickly at later time points as at earlier time points. Thus, we hypothesized that lower-order writing ability in English and Spanish would exhibit curvilinear (quadratic) change, and built our models accordingly.

3. Results

3.1. *Descriptive Analyses of Students from Different Home Language Environments*

In Table 1 we present descriptive statistics for the demographic characteristics of students by home language background. Students in predominantly or entirely Spanish speaking homes evidenced lower levels of family income and maternal education and higher percentages of free and reduced price lunch eligibility than their peers in more English dominant language homes, indicating lower overall mean SES for students with greater amounts of Spanish use at home. Interestingly,

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students' scores across the Raven's CPM were far less discrepant, with the average range across home language groups being only two points. Students in English only households still scored higher on the Raven's CPM than their peers from homes where more Spanish was spoken (p< .001), but the gap in scores was very small.

Table 1
Demographic Characteristics by Home Language Input Category

Variables	**English Only (17%)**		**Predominantly English (26%)**		**Spanish and English (16%)**		**Predominantly Spanish (29%)**		**Spanish Only (12%)**	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Free Lunch	.13	.34	0.21	0.41	0.45	0.51	0.87	0.34	0.86	0.35
Income	7.23	2.63	7.33	2.17	5.18	2.79	2.90	1.67	2.60	1.35
Mother's education	16.07	3.71	15.82	4.01	13.28	4.72	9.38	4.69	8.33	4.36
Female	.44	.50	0.56	0.50	0.59	0.50	0.50	0.50	0.45	0.51
Ravens	30.58	4.03	30.29	4.29	29.07	4.50	28.23	3.98	28.14	3.67

In Table 2 we present descriptive statistics for the Basic Writing Skills standardized W scores for students across home language input groups for all four waves of data. On average across groups, English writing improved by approximately 16.5 W-score points from grade 2 to grade 3, by approximately 9.3 W-score points from grade 3 to grade 4, and by only 4.6 W-score points from grade 4 to grade 5. These data demonstrate that the largest growth in English writing performance occurred between grade 2 and grade 3.

Table 2
Mean Spanish and English Writing Scores for students with different home language input from Grade 2-5

Variables	**English Only (17%)**		**Predominantly English (26%)**		**Spanish and English (16%)**		**Predominantly Spanish (29%)**		**Spanish Only (12%)**	
English Writing										
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Grade 2	480.25	17.10	467.04	19.30	457.82	17.42	451.20	27.21	455.47	14.38
Grade 3	491.66	13.87	482.94	13.79	477.24	13.79	471.04	13.27	471.32	9.61

Variables	English Only (17%)		Predominantly English (26%)		Spanish and English (16%)		Predominantly Spanish (29%)		Spanish Only (12%)	
Grade 4	496.81	14.43	493.22	12.73	487.96	13.84	480.00	11.23	482.67	14.40
Grade 5	505.23	14.59	496.44	11.41	492.83	10.57	485.33	10.14	483.95	12.02
Spanish Writing										
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Grade 2	462.13	11.06	466.45	9.37	468.39	12.68	467.45	12.21	470.91	11.30
Grade 3	470.25	11.13	473.40	10.28	480.31	13.99	475.55	12.86	477.36	15.69
Grade 4	476.39	12.78	481.38	11.32	487.46	15.41	480.50	12.20	485.29	12.03
Grade 5	481.57	10.28	484.46	11.07	490.96	12.76	485.60	12.45	489.84	12.68

This same pattern of growth is supported when exploring the Spanish writing performance across the waves of data. On average across groups, Spanish writing improved by approximately 8.3 W-score points from grade 2 to grade 3, by approximately 6.8 W-score points from grade 3 to grade 4, and by only 4.2 W-score points from grade 4 to grade 5. These data provide further evidence for a potential curvilinear relationship between time and writing performance in both English and Spanish across the different groups, as the largest growth in each language occurred between wave one and two.

3.2. *Research Question 1*

We fit several multilevel models for change to the data to explore the average patterns of growth in lower-order writing ability in both Spanish and English. In Tables 3 (English) and 4 (Spanish) we display the unconditional quadratic growth models for writing performance to answer our first research question regarding the average pattern of growth for TWI students. Table 3, Model 1 shows that the average initial score for students' English writing performance was a score of 461.93 points, with an average true instantaneous rate of growth in English writing performance at initial status of approximately 1.61 W-score points per month and a rate of acceleration of -.02 W-score points a month. Table 4 Model 1 similarly presents a quadratic relationship for Spanish writing performance. In this model, the average W-score at grade 2 for students' Spanish writing performance was 466.82, with a true initial rate of instantaneous growth of .78 W-score points per month, and an acceleration of -.007 W-scale points a month. For both outcomes of interest, the

acceleration slope is negative, indicating a decreasing speed of acceleration over time.

Table 3

Estimates of fixed and random effects from a series of growth models with time centered at initial status for English writing development (n=185)

	Model 1 (unc)	**Model 2**
Fixed Effects		
Intercept	461.93***	473.90(2.25)***
MONTH	1.61(.08)***	1.49(.10)***
Month*Month	-0.02(.002)***	-.02(.002)***
HomeLangInput		-4.43(1.17)***
Ravens3		1.19(.20)***
Income		1.02(.35)**
HomeLanguageinput*Month		.06(.02)*
Homelanguageinput*Month*Month		
Level 2 Random effects		
Residual (within individual)	59.99(4.65)***	60.60(4.84)***
Intercept	355.83(41.88)**	220.38(29.27)***
Slope	.09(.02)***	.09(.02)***
Covariance	4.81(.80)***	-3.75(.69)***
-2 loglikelihood	5249.60	4861.7

***p≤ .001, **p≤.01, *p≤.05, ~p≤.1

Table 4

Estimates of fixed and random effects from a series of growth models with time centered at initial status for Spanish writing development (n=185)

	Model 1 (unc)	**Model 2**
Fixed Effects		
Intercept	466.82(.87)***	463.83 (1.46)***
MONTH	.78(.05)***	.78(.05)***
Month*Month	-.007(.001)***	-.008(.001)***
HomeLangInput		2.06(.68)**
Ravens3		.62(.20)**
Income		
HomeLanguageinput*Month		
Homelanguageinput*Month*Month		
Level 2 Random effects		
Residual (within individual)	25.73(2.01)***	25.43(1.99)***
Intercept	116.16(14.13)***	106.40(13.21)***
Slope	.02(.01)**	.02(.007)***
Covariance	.09(.21)	.10(.20)**
-2 loglikelihood	4761.6	4707.5

***p≤ .001, **p≤.01, *p≤.05, ~p≤.1

3.3. *Research questions 2 and 3: Predicting Initial and Final Writing Performance and Growth of Bilingual Students*

To respond to our second and third research questions, we present our final models (listed as Model 2 in Tables 3 through 6) that estimate the potential explanatory power of home language input for the English and Spanish writing performance of bilingual students. First we examined whether students' home language input predicted students' initial level of writing performance in each language and/or patterns of growth from grade 2 to grade 5. We then explored potential differences in writing performance among students from these different home language groups at grade 5.

English Writing Performance. In our final model predicting English writing performance (Model 2 in Table 3), home language input was negatively associated with writing performance at initial status (second grade), meaning that students who came from homes that used more Spanish had lower 2nd grade English writing scores. Specifically, each level of increased Spanish use at home was associated with a decrease of 4.43 points in English writing scores in second grade, controlling for student's scores on the Raven's Progressive Matrices (b=1.19, SE=.20, p<.0001) and family income (b=1.02, SE=.35, p<.001) as well as initial slope (b=1.49, SE=.10, p<.0001) and acceleration (b=-.02, SE=.002, p<.0001). However, despite this lower score at initial status, students with higher levels of Spanish home language input also demonstrated a faster initial rate of growth on average. Each level of increased Spanish use at home corresponded to a .06 W-score point difference in rate of change in English writing ability (p<.0001), controlling for the rate of accelerated growth over time (b=-.02, SE=.002, p<.0001) and our covariates. This translates to a 2.2 point difference in writing performance over the 36 months of data collection per level of home language use, for a maximum difference of 8.6 points between students who spoke only English at home and students who spoke only Spanish at home. Students' rate of acceleration (i.e. quadratic growth) as a function of home language input was not found to significantly predict students' English writing performance and thus was not included in the model. Thus, while increased use of Spanish at home was associated with lower scores in English writing performance at second grade, it was also associated with faster rates of growth, increasing the likelihood of eventually closing the English writing gap among students with varying amounts of English and Spanish home language use.

In Table 5, Model 2 we present the same model as is presented in Table 3 but with time centered at fifth grade to respond to our third research question regarding the predictive validity of home language input for English writing performance at final status. Here, each level of increased home Spanish input corresponded to a decrease in English writing outcome of 2.26 W-score points on average, controlling for student's scores on the Raven's Progressive Matrices (b=1.19, SE=.20, p<.0001), family income (b=1.02, SE=.35, p<.001), final rate of growth (b=-.04, SE=.10, ns), final rate of acceleration (b=-.02, SE=.002, p<.001), and the interaction between home language input and rate of instantaneous rate of growth (b=.06, SE=.02, p<.05). Thus, while students with greater levels of English home language input still had significantly higher English writing scores at final status, the gap in writing scores was smaller than it was at initial status.

Table 5

Estimates of fixed and random effects from a series of growth models with time centered at final status for English writing development (n=185)

	Model 1 (unc)	**Model 2**
Fixed Effects		
Intercept	492.38***	500.08 (1.48)***
MONTH_5	.08(.08)	-.04(.10)
Month_5*Month_5	-0.21(.002)***	-.02(.002)***
HomeLangInput		-2.26(.86)**
Ravens3		1.19(.20)***
Income		1.02(.35)**
HomeLanguageinput*Month_5		.06(.02)*
Homelanguageinput*Month5*Month_5		
Level 2 Random effects		
Residual (within individual)	59.81(4.63)***	60.60(4.84)***
Intercept	123.40(18.61)**	60.65(12.53)***
Slope	.09(.02)***	.09(.02)***
Covariance	1.61(.43)***	-.69(.38)
-2 loglikelihood	5235.8	4861.7

***p≤ .001, **p≤.01, *p≤.05, ~p≤.1

Figure 1 displays fitted growth trajectories for prototypical students with the five different levels of home language input. The lines representing the trajectories of each language group show that the shape of growth differs as a function of the language group, as does initial and final writing elevation. The figure shows that students from households where there is only English input begin with a higher elevation than the other groups; however this group decreases the most in its speed of acceleration, resulting in a smaller difference in elevation across home language groups at final status. All student groups decrease in their rate of growth over time, but the figure clearly shows that the decreasing rate of growth is more pronounced for students with higher levels of English input at home. Hence, students from Spanish dominant households are closing the size of the gap in writing performance in English over time.

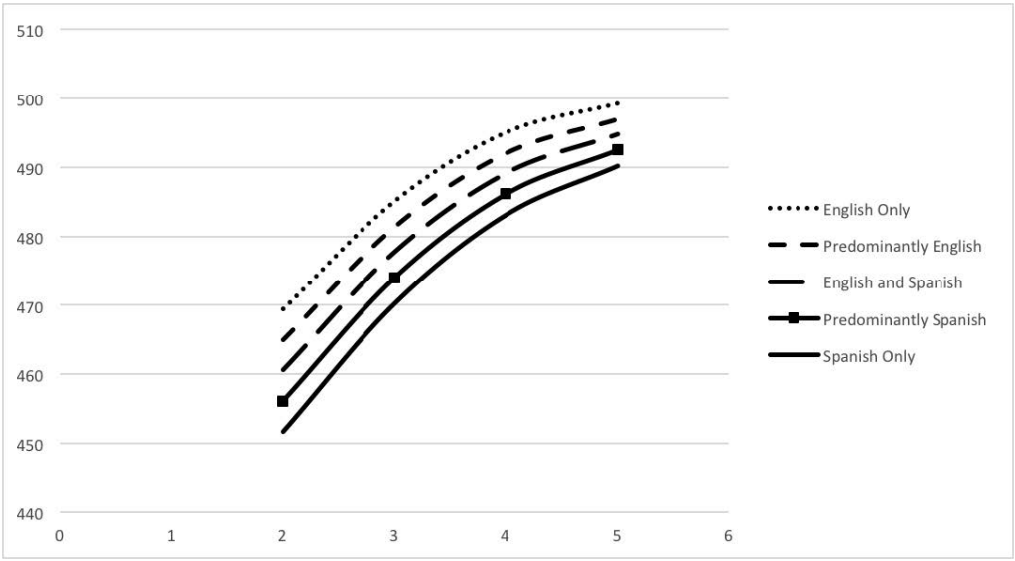

Figure 1. Fitted growth trajectories for English writing performance for prototypical student cases with different levels of home language input.

Spanish Writing Performance. In our final model predicting Spanish writing performance (see Table 6 Model 2), home language input was positively associated with writing performance at initial status. Students who came from homes that were more Spanish dominant had higher scores on Spanish writing performance at the second grade time point. At initial status, each point of increased Spanish use on the home language input scale students was associated with an increase of 2.06 W-score points on Spanish writing performance, when controlling for student's scores on the Raven's Progressive Matrices (b=.62, SE=2.0, p<.001), initial instantaneous rate of change (b=.78, SE=.05, p<.0001), and rate of acceleration (b=-.008, SE=.001, P<.001). Family income was not statistically significant and thus was removed from the final model. There were no statistically significant interactions between home language input and initial slope or acceleration. Given the lack of a statistically significant interaction between students' home language input and instantaneous rate of change and rate of acceleration, we would not expect the parameter estimate for home language input at final status to differ at final status. This is born out in Model 2 in Table 6 which estimates a model with time centered at fifth grade (b=2.06, SE=.68, p<.01) showing that each one unit increase in the level of Spanish home language use is associated with a 2.06 W-score points increase in Spanish writing. Figure 2 displays fitted growth trajectories for prototypical students with the five different levels of home language input. The shape of growth is the same across language groups, but the elevation of the different groups at

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both initial and final status is different, with students with higher levels of Spanish exhibiting higher elevations. Thus, Spanish dominant students maintained their Spanish writing advantage all the way through to fifth grade.

Table 6

Estimates of fixed and random effects from a series of growth models with time centered at final status for Spanish writing development (n=185)

	Model 1 (unc)	**Model 2**
Fixed Effects		
Intercept	485.28(.97)***	480.27 (1.54)***
MONTH_5	.24(.05)***	.24(.05)***
Month_5*Month_5	-.007(.001)***	-.008(.001)***
HomeLangInput		2.06(.68)**
Ravens3		.62(.20)**
Income		
HomeLanguageinput*Month_5		
Homelanguageinput*Month5*Month_5		
Level 2 Random effects		
Residual (within individual)	25.66(1.99)***	25.43(1.99)***
Intercept	141.51(17.29)***	134.24(16.76)***
Slope	.63(.26)**	.68(.26)**
Covariance	.015(.01)*	.016(.007)**
-2 loglikelihood	4745.5	4707.5

***p≤ .001, **p≤.01, *p≤.05, ~p≤.1

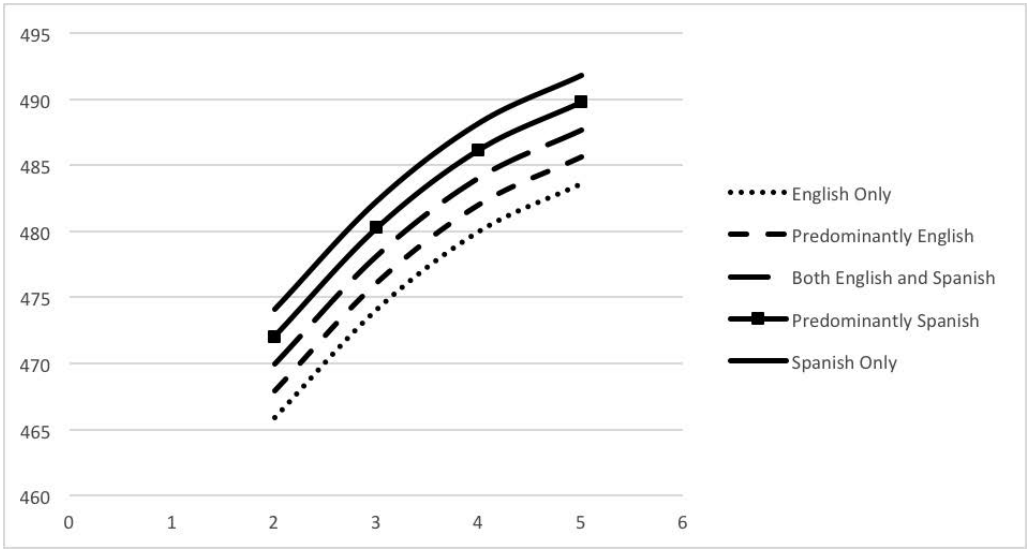

Figure 2. Fitted growth trajectories for Spanish writing performance for prototypical student cases with different levels of home language input.

4. Discussion

There are several key points that emerge from these findings. First, there was continuous growth in both languages for students from all home language backgrounds. Interestingly, models of both English and Spanish writing predicted quadratic growth that tapered off in the upper elementary grades. Both of these findings mirror those of Howard (2003), another study of the Spanish/English writing development of TWI students in the upper elementary grades, which is particularly illuminating given that the earlier study relied upon a researcher-developed, global-writing measure while this study relied upon a standardized measure of basic writing ability. This study thus corroborates and strengthens these earlier findings through the use of a standardized measure, and also provides new evidence of the curvilinear nature of English and Spanish lower-level writing skill development in particular. It may be the case that lower-order skills are particularly inclined to show decreasing acceleration through the upper grades and beyond as they are by definition skills that models of writing development indicate are foundational, and represent a constrained skillset that becomes automatic over time (e.g. Berninger, et al., 1992). However, it is interesting to note that in the case of WLPB-R Basic Writing Skills cluster in particular, mean scores of the norming population peak at 532.5 points for age 30-39 years, well above the predicted 5th grade intercepts of

500 points for English and 480 points for Spanish, indicating that there was considerably more room for growth in both languages and neither the measure nor the construct constrained growth to quadratic trajectories with decreasing acceleration over time.

Second, there was evidence of a home language advantage in both English and Spanish writing, with the highest predicted writing scores in each language associated with the greatest amount of home language input in that language. This again mirrors the findings of Howard (2003) as well as literacy research on bilinguals in general, as many studies have noted a modest positive correlation between home language use and language and literacy outcomes in that language, and conversely, a modest negative correlation between home language use and language and literacy outcomes in another language (August & Shanahan, 2006; Durgonoglu & Goldenberg, 2011).

Finally, an important finding from the present study is that students with increased levels of Spanish input at home were closing the gap in English writing. This finding was also mirrored by the earlier longitudinal study of TWI writing outcomes (Howard, 2003), as well as by a number of reading studies (Kieffer, 2011; Lesaux et al., 2007). It is interesting that the same phenomenon did not occur in Spanish writing for those from more English dominant homes - that is, there was no difference in the initial rate of change associated with home language input, such that predicted differences in Spanish writing ability across home language subgroups remained stable at all time points. This finding likewise coincides with those of Howard (2003), as well as other biliteracy studies that found that exposure to Spanish both at home and at school was required for the attainment of high levels of Spanish literacy (Carlisle & Beeman, 2000; Duursma, et al., 2007), here focusing specifically on the development of lower-order writing skills.

5. Limitations

There are, of course, several limitations of this study. First, the writing outcome measures only assessed lower-order writing skills and not higher-order text composing skills. This raises the possibility that this pattern of growth is related to the construct (i.e. lower-order, transcription skills), and not a true representation of writing development more broadly defined. However, given the parallel finding in reading research for both native English speakers and bilinguals (e.g. Chall, 1983; Lesaux, et al., 2007; Nakamato, et al., 2007) it seems plausible that this is the case for higher-order writing as well. Future research could extend this line of in-

vestigation by using a measure that permits investigation of both lower-level and higher-level writing ability. Similarly, the outcome measures were designed for and normed with monolingual speakers of each language. Given the absence of standardized writing assessments of writing ability normed on bilingual populations, this assessment was still deemed the most appropriate choice for our study as it provides parallel forms in English and Spanish, allowing for the exploration of writing ability in bilingual children in both languages. Future studies could be strengthened by relying on measures that are designed specifically for research with bilingual learners, that is, measures that do not assess bilinguals as though they were two monolinguals in one student, but instead more accurately capture the more fluid nature of language use for bilinguals (Escamilla, 2006; García, Kleifgen, & Falchi, 2008). Finally, the estimated statistical model did not permit an investigation of school-level effects (i.e., the model could not converge), such as program model. Larger studies could help to investigate the role of school-level factors in English and Spanish writing development.

6. Conclusion

In summary, this paper has provided new evidence of patterns of growth in English and Spanish lower-order writing ability among TWI students, and explored the similarities and differences in these patterns of growth for students with varying home language profiles. All of these findings, particularly those that relate to the quadratic nature of writing development and the faster growth rate among students who received more home language exposure to Spanish, point to the importance of longitudinal research to truly shed light on the literacy attainment of bilinguals. Moreover, they provide support for the value of home language maintenance among emergent bilingual students, as the students from homes where more Spanish was spoken demonstrated ongoing growth in writing ability in both languages, with a consistent advantage in Spanish writing and a narrowing of the gap in English writing. Continued work in this area is needed to better understand the writing attainment of bilingual learners.

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