

Knowledge of Orthographic Features in Spanish Among Bilingual Children

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Abstract

Orthographic features of English spelling can be ordered according to a developmental progression (Viise, 1994). Such features, when scored dichotomously and arranged according to difficulty, form a scale that is unidimensional and cumulative. The purpose of the present study is to determine if similar graphophonemic features exist in Spanish orthography and develop an instrument to assess them. A Test of Spanish Word Features (TSWF) was devised and pilot tested on 129 elementary school children. After revision, the instrument assessed 12 Spanish word features through the spellings of 50 exemplar words clustered into groups of five. The TSWF and its English counterpart were administered to 196 first, second, third, fourth, and fifth graders. Individual spelling features in Spanish proved to be internally consistent (reliable), but, when arranged according to difficulty, formed a scale that was only marginally cumulative. Compared to those of English, the Spanish word features varied little in complexity, and the evidence that children mastered them in a particular order was less compelling.

An increasing number of educators and researchers have embraced the additive model of bilingualism—a tradition which holds that learning a second language is aided by knowledge of a first (García, Jimenez, & Pearson, 1998). In recent years, a number of investigators have systematically documented the knowledge and strategies Spanish speakers bring to the classroom when they learn English as a second language. It is now known that such individuals pose a rich understanding of cognates and a host of metacognitive strategies to help them learn to speak a new language (Jimenez, García, & Pearson, 1996).

Much has been learned about bilingualism over the last three decades, but little is known about biliteracy. We believe it is important to learn more about how fluent readers, competent writers, and accurate spellers in one

language go about the task of acquiring comparable skills in a second language. Because the orthographies of Spanish and English present intriguing contrasts and similarities, these two languages provide ideal vehicles for initial study of spelling transfer. Whereas written Spanish employs a shallow orthography, English relies on a letter to sound map that is both complex and subtle. Indeed, Spanish orthography is so transparent that young students correctly spell words they cannot yet read—a phenomenon never observed among children learning to spell English.

We have reason to believe, then, that students who learn to read Spanish first, and English second, approach the new language with a greater expectation of predictability and orderliness than those who learn these languages in reverse order. For this reason, Spanish-first students are likely to develop a richer sense of phonemic awareness and profit more from phonics instruction than their English-first counterparts. Thus, Spanish-speaking youngsters who are taught to read and write their native language before becoming literate in English will probably learn to spell better in both languages. In our view, the time has come to test these conjectures—to document the advantages, if any, that accrue to biliterate students who first become literate in Spanish. However, any such test depends upon the development of appropriate and comparable measures of children's knowledge of the written features of both languages.

According to the National Center for Research on Cultural Diversity and Second Language Learning (1996), there are many promising approaches to instruction consistent with current knowledge about how children learn—approaches cognizant of the cultural and linguistic context in which learning occurs. Unfortunately, comparable advances in how to assess learning have not been made. Most researchers continue to rely on standardized tests to document successful instruction, tests that are astonishingly off-target for minority students, inappropriate for those not fluent in English, and insensitive to many kinds of learning advocated by educational reformers.

The goal of the present series of studies is to introduce and refine a new type of measuring device, one more appropriate for assessing understanding of the orthographic features that underlie written language. Our immediate objective, however, is more modest. It is to develop a measure of children's progressive understanding of the written features of Spanish that is both reliable and valid. Such an assessment tool could be used to inform educators who are using developmental methods of teaching early reading in a transitional bilingual context.

We began with the work of Viise, (1994) who studied graphophonemic features in English. According to Viise, features of English spelling can be ordered according to a developmental progression. Children comprehend the simplest features first, and, with development, master the more difficult. As Viise has shown, a number of spelling features, when ordered according to difficulty and scored dichotomously, form a Guttman scale—a scale that is

unidimensional (the items are intercorrelated) and cumulative (passing an item entails passing all those less difficult and, conversely, failing an item entails failing all those more difficult). On the basis of years of research on children's understanding of English spelling, we expected to find at least some features of Spanish orthography that would, when ordered according to difficulty, form a Guttman scale. The purpose of the present study is to identify such features, create an instrument to assess them, and assess their scalability.

Method

Pilot Study

Our study began by interviewing six primary grade bilingual teachers of Spanish-first language students at Davy Crockett Elementary School in Grand Prairie, Texas. One teacher, who was familiar with the Word Features Spelling List (WFSL), a scale of English word features devised by Viise (1994), worked with us to create the first draft of the Test of Spanish Word Features (TSWF). The initial list contained 50 words illustrating 20 presumed features of written Spanish. To enhance our exemplar words and generate sentences to illustrate word meanings, we enlisted the support of the other participating teachers.

In the end, we created a pilot version of an instrument to assess children's understanding of 20 Spanish features. This version of our Test of Spanish Word Features consisted of 20 clusters of five words (in one instance, 10) accompanied by brief sentences illustrating each word in context. Each cluster included words targeted to a feature of interest. For example, the first group of five words exemplify a single beginning consonant: *raton* (*El raton es negro*), *gallo* (*El gallo canta*), *mal* (*Estoy mal*), *voy* (*Yo voy a comer*), and *hijo* (*El hijo es pequeno*). Some words, such as "hecho," are exemplars of more than one feature (in this case, irregular endings and silent h). Respondents are asked to spell all the words as best they can.

To pilot the TSWF, the six volunteer teachers administered the instrument to 129 students (32 first-, 22 second-, 22 third-, 21 fourth-, and 32 fifth-graders). Teachers were told to test the children's spelling of all the exemplar words without the benefit of study or memorization. The test was scored as follows:

First, each word was marked as correct or incorrect. Unlike conventional spelling tests, a word was considered correctly spelled if the feature it represented was appropriately represented. For example, "llama" was intended to probe for an understanding of a single ending vowel. With respect to this feature, a spelling such as "lama" would be marked correct because the single ending vowel is correctly rendered.

Second, we obtained 20 scale scores, one for each feature, by counting the number of correctly spelled exemplar words. To estimate the internal consistency of each feature scale, alpha coefficients were computed. Four

scales yielded low alphas (below .60) and were removed from the test. Because each feature is represented by five exemplars, scale scores could range from zero (none correct) to five (all correct).

Third, on the basis of feature mastery, we recoded the 16 remaining scales as dichotomies (“1” or “0”). A feature was considered “passed” (mastered) if the respondent correctly rendered at least four of the five exemplar words—otherwise, it was considered “failed” (i.e., not mastered).

Finally, we conducted a Guttman scalogram analysis on the dichotomously scored features. (More detailed information about Guttman scalogram analysis will be presented later.) Four features produced a high number of scaling errors and were jettisoned from the test. Thus, the final version of the test contained 12 distinct features of written Spanish.

Main Study

Participants

The participants in the main study included 200 children who were attending Alisal Union and Caesar Chavez Elementary Schools in Salinas, California. There were 34 first-, 57 second-, 55 third-, 25 fourth-, and 29 fifth-graders. In the district where these schools are located, 85% of the students are Hispanic and 71% have limited proficiency in English. Recently, these schools began restructuring their early literacy programs in both English and Spanish. Their intent is to help students become successful readers and users of both languages. Because the investigation was designed to develop a diagnostic instrument to support such efforts, the administrators and teachers at both schools provided a high level of support for our study.

Measures

In the current study, two instruments were used to assess word features: The Test of Spanish Word Features (TSWF) and Word Features Spelling List (WFSL). The TSWF was designed to assess mastery of 12 Spanish spelling features. It consists of 50 “exemplar” words clustered into groups of five. Each cluster targets a distinct feature of spelling. For example, Feature A, a single ending vowel, includes the following exemplars: *zorro*, *vaca*, *alli*, *leche*, and *tu*. Brief instructions about how to score exemplars are provided under each feature description. Unlike the others, Feature I (s/z distinction) and Feature J (r/rr distinction) are assessed by re-scoring exemplars selected from other word clusters. For this reason, we are able to score the test for 12 different features, each based on at least five different words, with a sample of only 10 groups of five words each. The complete TSWF is presented in Appendix 1.

The WFSL, the forerunner of the TSWF, was designed to assess the mastery of 12 English spelling features. Although assessing different content, the form of the two instruments is similar. Like the TSWF, the WFSL was

designed to assess 12 features and contains clusters of exemplar words targeted to each. Details about this instrument and evidence supporting its psychometric quality can be found in Viise (1994).

Procedures

Five trained teacher volunteers tested all the children in their classrooms. The TSWF was administered first; then, for the children who had already received some instruction in English, the WFSL was administered. The teacher volunteers were given the following instructions:

This spelling test was designed to assess children's abilities to represent sounds of words with letters of print. It is not necessary that every word be spelled completely correctly. This test is not intended yield "right" or "wrong" answers, but to determine how close the children can get to the correct spellings of words. It is essential that children not have an opportunity to study these words as they might for a normal spelling test.

Give the test by calling each word in isolation, using it in the example sentence, and then repeating the word. Encourage children to write what they think they hear for each word. If necessary, feel free to make up a different sentence in which the word is used.

The words are grouped in sets of five. Ask the children to write their words in the blanks on the answer sheet. The test is broken into two parts and can be administered on two different days—Items 1-25 on one day, items 26-50 on another day. There is no need to score the test; we will do that and share the results with you. At that time, we want to discuss instructional implications of the results.

If you think there are words that better illustrate the features tested, please make a note of it for our next revision. Also, if there are features of written Spanish that you think we have omitted, please share this with us.

Thank you for your help.

Once the children had completed the inventories, all testing materials were given to the authors for tabulation, scoring, and analysis. After removing all tests that were partially completed, there were 196 completed TSWFs and 159 WFSLS.

Results

We began by conducting a traditional psychometric analysis of the TSWF. As in the pilot study, we marked each word as correct or incorrect. A word was considered correctly spelled if the feature it represented was

rendered appropriately. We then obtained 12 scores, one for each feature, by counting the number of correctly spelled exemplar words. Because each feature is represented by five exemplars, these scores ranged from 0 (none correct) to 5 (all correct).

We then conducted a traditional psychometric analysis on each of the five-item feature scales. To estimate internal consistency, alpha coefficients were computed. Means, standard deviations, and coefficient alphas for each of the 12 feature scores are shown in Table 1.

Table 1
Means, Standard Deviations, and Alpha Coefficients as a Function of Spanish Spelling Feature

Feature	Mean	SD	Alpha
A: Single ending vowel	4.58	1.10	.85
B: Vowel inclusion in accented syllable	4.42	1.41	.93
C: Representation of syllable units	4.11	1.58	.89
D: Single ending consonant	4.18	1.58	.91
E: Simple suffixes	3.96	1.53	.82
F: Root constancy	3.98	1.64	.88
G: Beginning two-consonant clusters	3.97	1.74	.91
H: Vowel dophthongs	4.06	1.54	.96
I: S/z distinction	2.57	1.75	.74
J: R/ff distinction	.91	1.46	.82
K: Marked accents	2.92	1.70	.75
L: Silent h	2.13	1.66	.76

As can be seen in Table 1, the means varied widely (from .91 to 4.58), but standard deviations remained relatively constant (from 1.10 to 1.75). In general, the alpha coefficients were high; they ranged from .75 to .96. Thus, all 12 features were internally consistent. A similar analysis conducted on the WFSL revealed that English feature reliabilities ranged from .53 to .96.

Next, we converted the 12 TSWF scores into dichotomies on the basis of feature mastery. We deemed a feature mastered if the respondent spelled it correctly in four of the five exemplar words—otherwise, it was considered

not mastered. A “1” was assigned for each feature mastered, a “0” otherwise. For each respondent, two “mastery” scores were generated—one for Spanish and one for English—by summing across the 12 features of the respective instruments.

We then conducted Guttman Scalogram analyses to estimate the “scalability” of the mastery scores. By “scalability” we mean the extent to which items (in this case features), when ordered according to difficulty, form a continuum that is unidimensional and cumulative. The scalogram results for the 12 Spanish Features are shown in Table 2.

Frequency counts of items passed are shown as a function of mastery score (rows) and feature (columns). Rows were rank ordered by score; columns, by feature difficulty. In the first row of Table 2, it can be seen that six respondents earned a score of 12. The remaining entries show these same individuals passed all 12 items (a necessary condition for a perfect score!). The second row shows that 27 earned a score of 11. Of these, seven passed the most difficult item (Feature J), but failed one that was easier (four failed L and three, K). If the scale were perfectly cumulative, all 27 would have passed Features L and K, but not J. The seven “unexpectedly” correct answers on Feature J constitute “errors” in that they represent items that should have been failed. The fewer such errors, the more cumulative the scale.

To visually separate the entries that fit the expected cumulative pattern from those that do not, we drew a divider diagonally across both tables. Entries falling to the left and below the divider represent the “pass errors” made by all the respondents. For the Spanish Features, there were 90 such errors. Because every pass error entails a “fail” error on some other feature, there were also 90 fail errors. Collectively, our 196 respondents generated 180 scaling errors (out of a possible 2352 dichotomous entries—12 X 196) on the Spanish Features. As for the English features, 159 respondents generated 86 such errors (out of a possible 1908 dichotomous entries—12 X 159).

We computed coefficients of reproducibility and scalability, indices that quantify the degree to which scaled scores fit a cumulative response pattern. For the TSWF, these coefficients were .92 and .64 respectively; for the WFSL, they were .95 and .73. According to convention, a scale is considered cumulative when its reproducibility exceeds .90 and scalability .60 (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). Thus, both Spanish and English spelling features generated scales that were satisfactorily unidimensional and cumulative. However, evidence for the cumulativity of the Spanish features was less compelling. That is, the children generated proportionately more scaling errors on the TSWF than on the WFSL.

Table 2

Frequency Counts of Items Passed, Ranked by Mastery Score and Arrayed According to Difficulty Level

		Most Difficult Features							Least Difficult Features					
Score	Number	J	L	I	K	E	G	F	C	H	D	B	A	
12	6	6	6	6	6	6	6	6	6	6	6	6	6	
11	27	7	23	27	24	27	27	27	27	27	27	27	27	
10	30	4	13	21	24	29	29	30	30	30	30	30	30	
9	36	2	2	12	23	35	35	36	35	36	36	36	36	
8	45		2	5	7	41	43	45	41	42	45	45	44	
7	8					6	7	6	7	7	7	8	8	
6	7			1		5	5	3	6	5	4	5	6	
5	6	1		1		3	1	1	5	3	4	5	6	
4	2		1						1		2	2	2	
3	5	1				1	1	1	1	3	1	3	3	
2	5					1						5	4	
1	3											1	2	
0	16													
Total	196	21	47	73	84	154	154	155	159	159	162	174	175	
Errors	90	15	18	19	7	16	7	2	2	3	0	1	0	

Note. Entries in gray areas indicate the number of items passed that, on the basis of item difficulty, should have been failed. Frequency counts of pass errors for each feature are shown in the bottom row.

Finally, for both instruments, we looked at the mastery scores (Guttman scale totals) as a function of grade level. The results are shown in Table 3. It can be seen that the means increase nearly monotonically from grade to grade. For Spanish, the greatest gains are made between the first and second grade; for English, between third and fourth. For the 155 children who took both instruments, mastery scores for Spanish and English were moderately correlated ($r = .58, p < .001$).

Table 3

Means and Standard Deviations of Spanish and English Feature Totals by Grade Level

Grade	Spanish			English		
	Mean	SD	n	Mean	SD	n
First	4.09	3.96	34	3.33	1.37	12
Second	7.18	2.40	55	2.98	1.49	52
Third	8.92	2.70	53	3.77	1.77	53
Fourth	9.40	1.32	25	6.26	2.68	19
Fifth	9.48	2.13	29	8.13	3.08	23
Total	7.74	3.27	196	4.41	2.71	159

Note. Linear trends as a function of grade level were significant for both the TSWF ($F = 74.75$, $p < .001$) and the WFSL ($F = 69.41$, $p = .001$). Correlations with grade level were .51 for Spanish and .62 for English.

Discussion

It is clear from these results that spelling features in Spanish, like those in English, vary in complexity and are acquired during the early grades of school. It is hardly surprising to find that the bilingual children in our study tended to master Spanish features earlier than English features. After all, Spanish was their primary spoken language and they were more likely to have heard the Spanish words in their day-to-day speech. This level of familiarity would make their guesses as to spelling more accurate. The individual feature scores on the TSWF proved to be internally consistent (they were highly reliable), and, when scaled, formed a Guttman continuum that was marginally unidimensional and cumulative. These findings are consistent with the notion that spelling features in Spanish are acquired in a fairly consistent order. Such a developmental hypothesis is supported indirectly by the observation that mastery scores increased steadily, almost linearly, with grade in school. Moreover, TSWF scores are moderately correlated ($r = .58$) with those of the WFSL, a well-validated instrument designed to assess developmental orthographic features.

Our Spanish orthographic features did prove less cumulative than Viise's English word features. We are left to wonder whether these differences might be due to a greater variance in English orthography than in Spanish. Because

differences in feature complexity would be less distinct, a language with less orthographic variance in its features might be harder to scale. That is, we could imagine that the features are quite distinct but not different in complexity, with the result that the order in which children grasped them would be less predictable. Our results give rise to but do not answer such questions.

The Test of Spanish Word Features assesses each learner's understanding on a continuum of linguistic complexity. The span of word knowledge defined by this test includes the learner's knowledge of basic letter-sound correspondences (phonics) and extends to the beginnings of knowledge of patterns of meaning (morphology). The first steps on the continuum measured by this test entail knowing the correct single ending vowel and the inclusion of a vowel in every syllable. Knowledge of these simple features depends on understanding that letters in print predictably represent sounds of speech. The sounds of single vowels in Spanish are consistent, and at the ends of words they are most salient. The last step on the continuum measured by the test is the ability to mark accents that violate the phonetic conventions that govern syllabic stress in Spanish and to include the initial letter *h* in print, even though this letter in this position has no phonemic value.

Now that we have created a reliable test of Spanish Word Features, we are designing and field testing instructional strategies for improving knowledge of the orthography of Spanish in bilingual classrooms. Though Spanish is substantially more regular than English in its phoneme-grapheme correspondence, there are many potential confusions for children trying to read and write in Spanish. Learning to read in Spanish undoubtedly requires phonemic awareness and proceeds from a foundation of readiness through a developmental progression of encoding and decoding skills. The questions we want to address concern the nature of this readiness and the skills progression that follows in learning to read and write in Spanish.

Implications

Written Spanish and English share very similar alphabets and sound patterns, and literacy in either language depends on a critical insight: letters in print represent the sounds of speech. This is the alphabetic principle on which literacy in every alphabetic language depends. Though English and Spanish do not function in exactly the same way, even at the alphabetic level, a child learning to read in either Spanish or English must come to the realization that the job in reading is to turn letters into sounds; the job in writing is to turn sounds into letters. For the bilingual learner whose first language is Spanish, the Test of Spanish Word Features can tell a teacher what that learner knows about the relation between the sounds he or she can speak and hear and the letters that he or she can write and see. By testing the child in Spanish and English, the teacher can observe whether the children are applying the Spanish

system to English, or vice-versa. The information yielded by the TSWF can give the teacher a unique perspective into the thinking of children who are struggling to attain mastery of written Spanish. This can be of great value in directing instruction toward the features of written language that the learner needs to attend to in becoming literate.

References

- García, E. G., Jimenez, R. T., & Pearson, P. D. (1998). Metacognition, childhood bilingualism, and reading. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice*. Mahwah, NJ: Erlbaum.
- Jimenez, R. T., García, E. G., & Pearson, P. D. (1996). The reading strategies of bilingual Latino students who are successful English readers: Opportunities and obstacles. *Reading Research Quarterly*, *31*, 90–112.
- McLaughlin, B., & McLeod, B. (1996). *Educating all our students: Improving education for children from culturally and linguistically diverse backgrounds: Vol. 1. Final Report of the National Center for Research on Cultural Diversity and Second Language Learning*. Santa Cruz, CA: University of California, Santa Cruz. Retrieved May 3, 2002, from <http://www.ncbe.gwu.edu/miscpubs/ncrcdssl/edall.htm>
- Nie, M., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. H. (1975). *Statistical package for the social sciences: SPSS*. New York: McGraw-Hill.
- Viise, N. (1994). *Word feature spelling list: A diagnosis of progressing word knowledge through an assessment of spelling errors*. Charlottesville: University of Virginia.

Appendix 1

Test of Spanish Word Features

1. **zorro** - El zorro corre.
2. **vaca** - La vaca nos da leche.
3. **alli** - Jose esta alli.
4. **leche** - A mi me gusta la leche.
5. **tu** - Tu vas a la escuela.
6. **foto** - Toma una foto.
7. **perro** - El perro ladra mucho.
8. **gallo** - El gallo canta.
9. **vidrio** - Yo quebre el vidrio con la pelota.
10. **muchas** - Muchas gracias, senorita.
11. **libros** - Traeme los libros.
12. **senora** - La senora esta aqui.
13. **hablan** - Ellos hablan Espanol.
14. **mariposas** - Las mariposas son hermosas.
15. **ciudades** - Las ciudades son grandes.
16. **zapatos** - Yo tengo dos zapatos.
17. **arroz** - Me gusta comer arroz.
18. **noticias** - Dame las noticias.
19. **enfermedad** - Ella tiene una enfermedad seria.
20. **computadora** - Usa la computadora.
21. **voy** - Yo voy a comer.
22. **agua** - Aqui hay agua.
23. **tierra** - No juegues con la tierra.
24. **nuevo** - El libro es nuevo.
25. **traigo** - Yo traigo mi tarea.
26. **comamos** - ¡Comamos pronto!
27. **tengo** - Yo tengo cinco hermanos.
28. **pintan** - Ellos pintan la pared.
29. **baila** - Mi papa baila con mi mama.
30. **mira** - Mira el pez.
31. **globo** - Juanita juega con el globo.
32. **trabajar** - Yo voy a trabajar.
33. **choque** - Hubo un choque en la esquina.
34. **bravo** - ¡Bravo! Gritaron los aficionados.
35. **pluma** - Yo escribo con una pluma.

36. **pez** - El pez esta en el agua.
37. **verdad** - Digame la verdad.
38. **comer** - Yo voy a comer.
39. **raton** - El raton es gris.
40. **mantel** - Pon el mantel en la mesa.
41. **hijo** - Mi hijo es pequeno.
42. **hotel** - Vamos a quedarnos en un hotel.
43. **huevo** - La gallina puso un huevo.
44. **haz** - Haz tu tarea.
45. **hecho** - ¿Has hecho tu cama?
46. **café** - Yo tomo café.
47. **lápiz** - El tiene un lápiz.
48. **teléfono** - El teléfono.
49. **sábado** - Hoy es sábado.
50. **frió** - En invierno hace frió.