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An Analysis of English–Spanish Cognates as a Source of General Academic Language

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Three analyses of Spanish–English cognates were conducted, with the purpose of identifying features that might facilitate or inhibit bilingual students' cognate recognition and cross-language transfer of vocabulary knowledge. Results revealed that both the General Service List and the Academic Word List (AWL) contain a substantial number of English–Spanish cognates, a high percentage of which can be categorized by 1 of 20 cognate patterns. Orthographic and phonological transparencies were analyzed, suggesting that cognates are more transparent in terms of orthography than phonology. A frequency analysis indicated that most AWL cognates are more common in Spanish than in English. Results suggest that carefully designed cognate instruction may provide Spanish-speaking students with a "cognate advantage" in comprehending English academic texts.

INTRODUCTION

Students who speak English as a second language face a daunting task on the road to English literacy. They must learn a vast number of English words in order to comprehend the texts they are required to read in school. Researchers estimate that English-speaking students learn approximately 3,000 words per year (Nagy, Herman, & Anderson, 1985) and know as many as 75,000 words by the end of high school (Snow & Kim, 2007). The vocabulary development of Spanish-speaking English learners lags behind that of native English speakers at every level, putting them at risk for academic underachievement (August, Carlo, Dressler, & Snow, 2005; Snow & Kim, 2007). According to the recent National Assessment of Educational Progress (NAEP), only 17% of Latino fourth-grade children scored at the proficient or advanced level in reading, compared

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to 42% of Anglo students (National Center for Education Statistics, 2009). Although Latino achievement on NAEP has improved during the past decade, the achievement gap remains a major concern.

Despite the challenge that they face, Spanish-speaking students may have an advantage not available to all English learners. The Spanish and English languages share a common alphabet and 10,000–15,000 cognates, words that are Latin-based, mean approximately the same thing, and share similar orthographic features (Nash, 1997). The influence of Latin on the two languages has provided people who speak English and Spanish with a common linguistic heritage—a potential "fund of knowledge" (Moll, Armanti, Neff, & González, 1992) that bilingual students bring with them to American schools.[1]

English learners usually acquire words used for basic communication quickly; however, academic vocabulary is often much more difficult to master (Cummins, 1994). *Academic vocabulary* is a term used to describe the vocabulary needed for academic discourse and comprehension of content-area texts. It includes words that are used for general academic functions such as analyzing, interpreting, and evaluating information across disciplines—words such as *observe*, *conclude*, *system*, and *process*. Other forms of academic language consist of the technical, concept-laden words that are unique to each discipline and literary vocabulary (Hiebert & Lubliner, 2008). All three forms of academic language—general academic, content-specific, and literary—are part of a sophisticated linguistic register that is heavily Latin-based. In this study we focus on one of these vocabularies—general academic vocabulary. Typically, knowledge of general academic vocabulary words such as *form*, *model*, and *system* is assumed by authors of content-area texts, even though these words often change their meanings, parts of speech, and morphological forms in different subject areas (Nagy & Hiebert, 2011). A high percentage of general academic vocabulary words are Latin-based cognates, suggesting that Spanish-speaking students may be able to use their native language to acquire these words (Lubliner & Hiebert, 2008).

The frequency of cognates in academic English has a historical explanation. Spanish descended directly from Vulgar Latin, and Latin-based words are used for everyday communication purposes in Spanish. Corresponding Latin-based words in English are often more sophisticated than the more frequent German-origin vocabulary words. For example, *construct* and *construir* are cognates, descended from the same Latin word *construere.* However, *construir* is much more frequent than *construct* and is used for everyday communication in Spanish. The asymmetrical relationship between academic vocabulary words in Spanish and English is due to the direct descent of Latin to Spanish (simple word to simple word) and the circuitous path that Latin words followed as they were incorporated into English (simple word to more complex word). Some Latin-based words entered English via French as a result of the French domination of England from 1066 through 1399. Other Latin words came directly into English during the Renaissance to meet demands for a sophisticated scientific and literary register that the English language lacked (Barber, 2000).

Despite the potential advantage that cognates offer, bilingual students often fail to notice cognate pairs even when they appear to be quite transparent (August et al., 2005, Feldman & Healy, 1998; García, 1991; Nagy, 1995; Nagy, García, Durgunoglu, & Hancin-Bhatt, 1993).

[1]All references to bilingual students in this paper refer to those who speak Spanish as their first language, unless otherwise stated.

Nagy et al. (1993) documented that fifth- and sixth-grade bilingual, biliterate Spanish-speaking students circled less than half of the known cognates that they encountered on a test of cognate identification. The reasons why students find cognate identification so difficult are not fully understood. It seems likely that cognate transparency is mediated by individual differences, exposure to cognate instruction, and by the complex array of semantic (meaning-based), orthographic (writing/form-based), and phonological (the sound-based) features that characterize particular sets of cognates (August et al., 2005). Cognate pairs rarely match in every way. The degree of orthographic, phonologic, and semantic overlap between cognates can be viewed as a set of interrelated continua, ranging in each dimension from identical to very different.

Semantic Factors

Semantic relatedness is the gold standard in terms of cognate status, determining whether orthographically similar words in Spanish and English can be used by bilinguals in cross-linguistic transfer. However, semantic relatedness is not a simple construct. Spanish–English cognates share a common Latin root, but the languages have evolved over time, and cognates do not always mean precisely the same thing in terms of contemporary usage. For example, the Spanish word *molestar* descended directly from the Latin word *molestare* ("to bother or annoy") and retained the original meaning. The cognate equivalent *molest* entered English via Old French around the 12th century, gradually diverging from *molestare* and acquiring a deviant sexual connotation. The term *false cognate* is often applied to any set of words that do not mean precisely the same thing in two languages, such as *molest/molestar* (Prado, 1996, Sales, 1998). However, this term should be reserved for words that are entirely unrelated such as *rope* (a braided cord) and *ropa* (clothes) or words that have diverged so greatly that *no* semantic overlap can be discerned, such as *assist* ("help") and *asistir* ("attend"). Word pairs that are etymologically related, but share less than full meaning, can more accurately be labeled *partial cognates*. The degree of semantic overlap can be thought of as a continuum with full cognates that have identical meanings in the two languages (e.g., *art/arte)* at one end of the continuum and false cognates at the other end (e.g., *rope/ropa, rope/clothes)*. Despite the problem posed by incomplete correspondence between cognates, studies have shown that more than 90% of Latin-based cognates (French–English and Spanish–English) are full cognates, sharing substantial overlap in form and meaning (Granger, 1993; Moss, 1992).

Orthographic Factors

Cognates are not merely words that share meaning; they also share orthographic features that illustrate their common origin. Just as cognates vary along a continuum of semantic relatedness, they vary in orthographic overlap. The more similar the spelling of an English cognate is to its Spanish equivalent, the greater the degree of orthographic transparency (the degree to which cognate relatedness can be discerned due to similarity in written form). Nagy et al. (1993) found that students were more successful in identifying cognates when words had clear orthographic overlap (e.g., *animal/animal*). They noted that even small spelling differences reduced students' ability to recognize English–Spanish cognate pairs. The importance of orthographic transparency in cognate recognition is underscored by cognate priming studies conducted in a variety of

languages. Priming tasks entail exposing students to a set of words and later testing how quickly students recognize those words, compared to words that were not presented previously. This body of research measures students' response times to cognate and noncognate pairs and has consistently documented faster responses to cognates. For example, Dutch–English bilingual students, in a variety of studies, recognized cognates more quickly on priming tasks, learned them more readily, and forgot them less frequently than noncognate translation equivalents (de Groot & Keijzer, 2000; van Hell & de Groot, 1998). Cristoffanini, Kirsner, and Milech (1986) found that subjects in their study responded to cognates at a similar rate of speed as inflections and derivations from the same language. Bowers, Mimouni, and Arguin (2000) documented that French–English bilinguals responded more quickly to orthographically identical and highly similar cognates than to noncognate translation equivalents. The researchers concluded that, "cognate relationships are explicitly coded within the orthographic system" (Bowers et al., 2000, p. 1292).

Phonological Factors

Phonological overlap also plays an important role in cognate identification and cross-linguistic transfer. In fact, some psycholinguists believe that cognate pairing is based almost entirely on phonological representations in memory (Carroll, 1992). According to Carroll, hearing a word in a second language automatically activates words in the first language that are acoustically similar. Carroll explains that the degree to which semantic relatedness accompanies automatic phonological cognate pairing influences the amount of cross-linguistic transfer that occurs. Weak phonological correspondence between many cognate pairs complicates cognate recognition and makes it more difficult for bilingual students to transfer word meaning across languages. For example, Dressler (2000) examined fifth-grade Latino students' cognate awareness and response to cognate strategy instruction and found that the degree of phonological transparency was an important factor in bilingual students' ability to recognize cognates. August et al. (2005) suggested that phonological factors are particularly important in facilitating cross-language transfer for bilingual students who are not literate in their native language and are unfamiliar with Spanish words in their written form.

Spanish and English share a large number of orthographically similar, etymologically related words; however, the differing sound systems in the two languages can hinder cognate recognition if inappropriate phonological representations are automatically activated in response to print (Katz & Feldman, 1983, Kroll & de Groot, 1997). Schwartz, Kroll, and Díaz (2007) noted that the efficiency of bilingual lexical processing results from a complex interplay of orthographic, phonological, and semantic mappings. When cognates do not match in each critical dimension, processing speed is slower and students' ability to utilize cognate information is reduced. The current investigation is designed to identify the factors that could facilitate or inhibit students' cognate recognition among general academic words by students ranging in grade from upper elementary to secondary levels.

METHOD

The investigation began with the identification of English–Spanish cognates in two corpora that are important to English learners: (a) one that consists of words based on high frequency in written language overall—the General Service List (GSL), and (b) one that consists of words

chosen for their appearance in numerous content areas—the Academic Word List (AWL). (The words *corpus*/*corpora* are used in this study to refer to specific bodies of vocabulary words.) The original GSL list (West, 1953) included 2,000 headwords (base words) that were identified as most useful to English learners because of their frequency and usefulness in written English. Baumann and Culligan (1995) updated the GSL, including a total of 2,284 headwords ranked by frequency, based on the Brown Corpus (Frances & Kucera, 1982). The current analysis used the updated GSL.

The AWL was developed by Coxhead (2000) as a means of providing university students, who were learning English as a second language, with words that were critical in reading academic texts in a variety of disciplines. Coxhead identified 570 headwords representing 3110 words not included in the GSL and likely to be found in academic texts. The criteria that she used for inclusion in the AWL were (a) specialized occurrence: the word does not appear on the GSL word list, (b) range: a member of the word family occurs at least 10 times in each of the four main sections of the Academic Corpus and in 15 of 28 subject areas, and (c) frequency: word family members must occur 100 or more times in the Academic Corpus. According to Coxhead, the combination of the GSL and AWL corpora covers approximately 86% of the words found in the Academic Corpus.

The first author, Lubliner, a proficient but not native speaker of Spanish, translated the GSL and AWL headwords into Spanish and identified cognates in each corpus. The cognate lists were then compared to those of Rubén Morán-Molina (2010), director of the International Bénédict Schools of Languages Entrerios in Guayaquil, Ecuador. Lubliner's list corresponded to that of Morán-Molina on 91% of the GSL cognates and 85% of the AWL cognates. A native Spanish-speaking professor who was born in Mexico evaluated the list of discrepant words, determining which should be characterized as cognates. The cognate identification process resulted in a cognate corpus consisting of 426 AWL cognates, 772 GSL cognates, equalling a total of 1198 cognates.

Three analyses were conducted on the cognate corpus: (a) the pattern analysis was developed to classify cognates based on high-frequency orthographic shifts, (b) the transparency analysis examined the orthographic and phonological transparency of selected cognates from the GSL and AWL cognate corpora, and (c) the frequency analysis examined the relative frequency of cognates in Spanish and English.

Pattern Analysis

A cognate scheme was developed to classify cognates according to orthographic patterns. The first author began by examining the cognate corpus. Predictable orthographic shifts between Spanish and English word pairs were identified, and the cognate corpus was sorted by pattern. Three native Spanish-speaking teachers reviewed the list generated by the first author and suggested additional patterns. A revised list, including the patterns suggested by bilingual teachers, was developed and a classification protocol was designed to facilitate the sorting of cognates into pattern groups. When cognates could be classified in more than one way, the most specific pattern possible was selected. For example, the cognate pair *natural*/*natural* was categorized as Pattern 2 (*al*/*il*), based on the specific *al* ending, one of four patterns that are orthographically alike. The classification protocol also limited the number of letter shifts in patterns. For example,

cognate pairs sorted into the Add/Change category could have no more than two letter shifts (e.g., *group/grupo* has two shifts from English to Spanish—the deletion of the first *o* and the addition of the final *o*.) Cognate pairs with more than two letter shifts were classified as Other, a general category designated for cognate pairs that did not fit into any of the specific patterns. Once cognate patterns had been identified, they were sorted into five clusters: Cluster I—Same; Cluster II—Add/Change; Cluster III—Verbs; Cluster IV—*Es* Pattern; Cluster V—Other Pattern.

Lubliner and a Mexican American bilingual teacher independently sorted the cognates by pattern, using the classification protocol. The percentage of agreement between the two raters was 91.14% for the total cognate corpus. Ratings completed by a third rater (a Puerto Rican American bilingual teacher) were used to classify the cognate pairs when the first two raters disagreed. Table 1 includes a description of cognate clusters and patterns identified in this stage of the pattern analysis. The orthographic shifts described in Table 1 are based on English words, because this investigation focuses on cognates found in English-language texts.

The second stage of the pattern analysis entailed computing the number and percentage of cognates in the corpus corresponding to each cluster and pattern. Table 2 shows the representation of cognates in the GSL, AWL, and combined cognate corpora.

Transparency Analysis

The transparency analysis (Table 3) examined the degree of orthographic and phonological transparency exhibited by cognates belonging to different patterns. Orthographic transparency was evaluated by calculating the Longest Common Subsequence Ratio (LCSR). This statistical method entails dividing the longest sequence of letters shared by two words by the total number of letters of the longer word (Kondrak, 2001). The resulting cognate coefficients are then compared to determine the relative transparency of cognate pairs. For example, the longest common sequence of letters in the cognate pair *problem/problema* is p-r-o-b-l-e-m (7 letters), was divided by 8 (the number of letters in *problema*, the longer word), resulting in a coefficient of .88. The cognate pair *chemical/química* is much less orthographically transparent. The two words have a common four-letter sequence, m-i-c-a, divided by 8 letters in the longer word, producing a LCSR coefficient of .50.

Phonological transparency was determined by calculating the Common Phoneme Ratio (CPR). This method, developed by the first author, entails dividing the number of common phonemes in the cognate pair by the number of phonemes in the longer word. For example, the words *problem* [p-r-ah-b-l-eh-m] and *problema* [p-r-oh-b-l-ay-m-ah] share five phonemes representing the sounds /p/, /r/, /b/, /l/, /m/ in the words. When the common phonemes (5) are divided by the total phonemes in the longer word (8), the resulting coefficient (.63) provides an estimate of phonological transparency. It is important to note that, unlike LCSR, CPR is subjective and ratings are influenced by local and regional dialects in both languages.

A set of 42 cognate pairs was selected from the cognate corpus based on the following inclusion criteria: equal representation from the AWL and GSL lists, representation from each cognate pattern, and varying levels of orthographic transparency The first author and two native Spanish-speaking teachers (one Mexican American and one Puerto Rican American), who have Reading Specialist certificates, independently calculated the number of phonemes in the English words, the number of phonemes in the Spanish words, and the number of common phonemes. Reading

TABLE 1
Cognate Clusters and Patterns

Cluster	*Pattern*	*Differences Permitted*	*Examples*
I Same	(1) same - misc.	no differences (except accent)	*area/área*
	(2) *al, il*	one letter may be different	*animal/animal*
	(3) *ar, or*	one letter may be different	*popular/popular, color/color*
	(4) *able, ible*	one letter may be different	*visible/visible*
II Add/Change	(5) *ion*	up to two letters may be different plus ending & accent	*nation/nación*
	(6) add/change	up to two letters may be different	*fruit/fruta, group/grupo, art/arte*
	(7) *ary, ery, ory*	up to two letters may be different plus ending	*necessary/necesario*
	(8) *ty*	up to two letters may be different plus ending	*activity/actividad*
	(9) *ic, ice, ical*	up to two letters may be different plus ending & accent	*intrinsic/intrínseco* *medical/médico*
	(10) *ant, ent*	up to two letters may be different plus ending	*experiment/experimento* *instant/instante*
	(11) *ance, ence*	up to two letters may be different plus ending	*influence/influencia, importance/importancia*
	(12) *ure*	up to two letters may be different plus ending	*adventure/aventura*
	(13) *ous*	up to two letters may be different plus ending	*famous/famoso*
	(14) *ive*	up to two letters may be different plus ending	*active/activo*
	(15) *y*	up to two letters may be different plus ending	*economy/economía*
	(16) *ly*	up to two letters may be different plus ending	*finally/finalmente*
III Verbs	(17) *ing*	up to two letters may be different plus ending	*pasando*
	(18) *ed*	up to two letters may be different plus ending	*accepted/aceptado* *decided/decidido*
	(19) Infinitives	up to two letters may be different plus ending	*to cost/costar* *to move/mover* *to decide/decidir*
IV *Es*	(20) *Es* (beginning)	letters may be different plus beginning *es*	*student/estudiante*
V Other	(21) Other	any word that doesn't fit the other patterns or has too many differences	*coffe/café*

TABLE 2
Representation of Cognates in Clusters and Patterns

GSL						*AWL*						*TOTAL*					
Cluster			*Pattern*			*Cluster*			*Pattern*			*Cluster*			*Pattern*		
	#Cogs	*%*		*#Cogs*	*%*		*#Cogs*	*%*		*#Cogs*	*%*		*#Cogs*	*%*		*#Cogs*	*%*
I Same	73	9	1	16	2	I	41	10	1	5	1	I	114	10	1	21	2
			2	31	4				2	21	5				2	52	4
			3	19	2				3	10	2				3	29	2
			4	7	1				4	5	1				4	12	1
II Add/Change	412	53	5	75	10	II	171	40	5	16	4	II	583	49	5	91	8
			6	193	25				6	85	20				6	278	23
			7	13	2				7	7	2				7	20	2
			8	13	2				8	6	2				8	19	2
			9	19	2				9	13	3				9	32	3
			10	30	4				10	17	4				10	47	4
			11	27	3				11	5	1				11	32	3
			12	8	1				12	2	0				12	10	1
			13	5	1				13	0	2				13	5	0
			14	12	2				14	8	2				14	20	2
			15	16	2				15	12	3				15	28	2
			16	1	0				16	0	0				16	1	0
III Verbs	144	19	17	0	0	III	174	41	17	0	0	III	318	27	17	0	0
			18	0	0				18	1	0				18	1	0
			19	144	19				19	173	41				19	317	26
IV *Es*	18	2	20	18	2	IV	10	2	20	10	2	IV	28	2	20	28	2
V Other	125	16	21	125	16	V	30	7	21	30	7	V	155	13	21	155	13
Total	772					Total	426					Total	1198				

Note. *Percentages are rounded.

specialists conducted this analysis because their expertise in reading was important in accurately identifying phonemes for the analysis. Interrater reliability (Cronbach's alpha) for the CPR analysis ranged from .85 to .91 on the sets of words. Examples of the transparency analysis are provided in Table 3.

Frequency Analysis

The final analysis was a comparison of English and Spanish word frequency in terms of cognate pairs. The cognate corpora were divided into four word-frequency zones in each language, based on a frequency-sorting protocol developed by Hiebert, the second author. The first Word Zone (A) includes the first 1000 words; Word Zone B represents words ranked 1001–3000; Word Zone C includes words ranked 3001–5000; and Word Zone D includes words with ranking of 5001 or higher. Table 4 includes a matrix of these word-frequency zones, providing a comparison of the relative frequency of Spanish and English cognates in the corpus. The analysis of relative word frequency was limited to words that appear uniquely on the AWL list, since words on the GSL are, by definition, highly frequent in English.

TABLE 3
Analysis of Cognate Transparency

English	*Spanish*	*Corpus*	*Pattern*	*LCSR*	*CPR*
idea	*idea*	GSL	1 (same)	1.00	0.50
civil	*civil*	AWL	2 (*al*/*il*)	1.00	0.53
nuclear	*nuclear*	AWL	3 (*ar*/*or*)	1.00	0.71
visible	*visible*	AWL	4 (*able*/*ible*)	1.00	0.48
nation	*nación*	GSL	5 (*ion*)	0.50	0.34
problem	*problema*	GSL	6 (add/change)	0.88	0.63
machinery	*maquinaria*	GSL	7 (*ary*/*ery*)	0.20	0.48
difficulty	*dificultad*	GSL	8 (*ty*)	0.60	0.50
music	*música*	GSL	9 (*ic*/*ical*)	0.83	0.50
patient	*paciente*	GSL	10 (*ant*/*ent*)	0.50	0.42
science	*ciencia*	GSL	11 (*ance*/*ence*)	0.71	0.52
culture	*cultura*	AWL	12 (*ure*)	0.86	0.38
precious	*precioso*	GSL	13 (*ous*)	0.75	0.25
active	*activo*	GSL	14 (*ive*)	0.83	0.50
economy	*economía*	AWL	15 (*y*)	0.75	0.50
founded	*fundado*	AWL	18 (*ed*)	0.43	0.43
evaluate	*evaluar*	AWL	19 (infinitive)	0.75	0.38
specific	*específico*	AWL	20 (*es*)	0.80	0.60
cycle	*ciclo*	AWL	21 (other)	0.40	0.65
MEAN				0.73	0.49

TABLE 4
Analysis of Cognate Frequency in English and Spanish

	High Frequency	*Moderate Frequency*		*Rare*
AWL	*Spanish Word Zones 0–2 First 1000*	*Spanish Word Zone 3 1001–3000*	*Spanish Word Zone 4 3001–5000*	*Spanish Word Zones 5–6 5001+*
ENGLISH Word Zones 0–2				
First 1000	6	9	2	0
ENGLISH	*			
Word Zone 3				
1001–3000	40	40	6	0
ENGLISH	**	*		
Word Zone 4				
3001–5000	16	42	19	0
ENGLISH	***	**	*	
Word Zones 5–6				
5001+	37	84	58	0

*More frequent in Spanish (one zone); **More frequent in Spanish (two zones); ***More frequent in Spanish (three zones).

RESULTS

Pattern Analysis

The analysis of cognate patterns began with an examination of the combined cognate corpus. Results demonstrated that 87% of the 1198 cognates in the combined corpus can be categorized by one of the specific patterns described in Table 1. Four patterns (*ous, ly, ing, ed*) include less than 1% of the combined cognate corpus, suggesting that they might be dropped from future analyses. The remaining 16 patterns are grouped into four clusters: same, add/change, verbs, *es*. All of the cognate patterns, with the exception of *es*, entail consistent orthographic shifts in word endings.

The analysis of the GSL and AWL (Table 2) revealed considerable variation in the total number of cognates in each corpus and the distribution of cognates within each corpus among the cognate clusters and patterns. Cognates comprise 34% of the words in the GSL and are distributed across 18 of the 20 cognate patterns. (No GSL cognates were identified as belonging to the *ing* or *ed* patterns.) The add/change pattern is the most frequent, comprising 25% of the cognates found in the GSL cognate corpus. The next most frequent categories include infinitives (19%) and *ion* (5%). Approximately 84% of the GSL cognates can be categorized into one of the patterns identified in the pattern analysis (all patterns except other).

In comparison to the GSL list, the AWL includes a higher percentage of cognates overall (nearly 75% of the AWL headwords are cognates), more of which can be categorized by pattern (93%). The largest number of AWL cognates can be categorized as infinitives (41%), followed by the add/change pattern (20%). Table 2 includes the percentages of cognates in the GSL and AWL corpora and the combined corpus that can be categorized according to each cognate cluster and pattern. The following is a summary of the results, organized by cognate cluster.

Cluster I—Same

The four same cluster patterns (same-misc., same-*al*/*il*, same-*ar*/*or*, same-*able*/*ible*) represent a large number of cognates in both corpora. The GSL cognate corpus includes 73 cognates (9%) that can be categorized according to one of the same patterns. Forty-one AWL cognates, representing 10% of the corpus, are orthographically same-cluster cognates.

Cluster II—Add/Change

The add/change cluster includes a wide range of patterns, the most frequent of which is the add/change pattern. This pattern includes a large number of words from both lists (25% of the GSL and 20% of AWL). Orthographic shifts in words in this pattern are simple, usually entailing the presence of an additional letter (*a*, *e*, *o*) at the end of the Spanish word (*art*/*arte*). In some cases the silent *e* in the English word is replaced by a voiced vowel in Spanish (*motive*/*motivo*). Other orthographic differences in this category include vowel diagraphs such as *ou* in English that are not present in Spanish (*group*/*grupo*) and letter shifts such as the presence of double consonants in English, but not Spanish (*effect*/*efecto*). Other add/change patterns such as *ory*/*ary,*

ty, ic/ical, ant/ent, ance/ence, ure, ous, ive, and *ly* are relatively infrequent, appearing less in less than 5% of the cognates in either corpus.

Cluster III—Verbs

The verb cluster consists primarily of infinitives, the highest-frequency pattern on the AWL list (41%) and the second-highest frequency pattern on the GSL (19%). The fact that the AWL analysis was limited to headwords, a large percentage of which are infinitives, inflated the percentage on this list. The infinitive pattern is quite complex because Spanish infinitives can be constructed with an *ar, er,* or *ir* ending. Within-word letter shifts are common, as the following examples demonstrate: *to charge/cargar, to include/incluir.* These orthographic differences substantially reduce the transparency of infinitive cognate pairs.

Cluster IV—Es Pattern

The *es* pattern had to be categorized as a distinct cluster because it is the only set of words that are characterized by a first letter shift. Words that begin with *sc*, *sp*, or *st* in English are spelled with an *e* before the *s* in Spanish (*student/estudiante*). *Es* pattern words are low frequency in the cognate corpus, comprising approximately 2% of GSL and AWL words.

Cluster V—Other Pattern

All of the cognate pairs that do not fit one of the 20 patterns described above are categorized as Other. Most of these words are orthographically opaque, as the following examples demonstrate: *paragraph/párrafo, technique/técnica.* Sixteen percent of the GSL and 7% of the AWL cognates are categorized as Other.

Transparency Analysis

The transparency analysis examined the degree of orthographic and phonological transparency exhibited by cognates belonging to different patterns. Table 3 includes a representative sample of these cognates and their LCSR and CPR coefficients. Several patterns can be observed in the data in Table 3. The most obvious point is that cognates differ a great deal, both in terms of comparison to other cognates and in terms of the orthographic and phonological relatedness of one cognate to its pair. The correlation between LCSR and CPR coefficients is .22 (not significant), suggesting little relationship between orthographic and phonological transparency. The LCSR coefficients (mean .73) are generally much larger than the CPR coefficients (mean .49), demonstrating that the cognates in this corpus are substantially more transparent in terms of orthography than phonology. Four cognate pairs are spelled identically, and an additional five sets had LCSR coefficients above .80; however, none of the cognate pairs has a CPR–phonemic correspondence greater than .71.

Frequency Analysis

The frequency analysis (Table 4) examined the comparative frequency of English and Spanish cognates, according to Hiebert's frequency zones. This analysis was limited to words that appear uniquely on the AWL list, since words on the GSL are, by definition, highly frequent in English. Sixty-six cognate pairs could not be evaluated because the Spanish word ranking was unavailable, leaving 360 AWL cognate pairs out of a total of 426 to be evaluated in terms of relative frequency. The analysis (Table 4) revealed that 277 AWL cognate pairs (77%) were more frequent in Spanish than English; 66 cognate pairs (18%) were of equal frequency in the two languages, and 17 cognate pairs (.05%) were more frequent in English than Spanish. One hundred and thirty-seven cognates (38%) were substantially more common in Spanish than English, varying by two or three frequency zones. This category of cognates includes words such as *acquire* and *demonstrate* that are part of the academic register in English, while the corresponding cognates (*adquirir, demostrar*) are everyday words in Spanish. The results of the frequency analysis demonstrate that a large percentage of AWL cognates are everyday words in Spanish.

DISCUSSION

As students get older, their academic texts include an increasing number of conceptually complex words, a corpus of general academic and content vocabulary words that are essential to comprehension (Nagy & Hiebert, 2010). Fortunately, a substantial number of these words are English–Spanish cognates. Bravo, Hiebert, and Pearson (2007) found that 76% of the words identified for instruction in the fourth-grade science units they reviewed were English–Spanish cognates. Carlo et al. (2004) concluded that 68% of the words judged to be difficult in middle-grade texts were cognates. The percentage of cognates in adult texts appears to mirror that found in texts designed for children. Martínez (1994) examined 257 subtechnical vocabulary words found in adult texts and found that two thirds of the words were cognates.

The high percentage of cognates in academic texts suggests that cognates might provide a powerful tool for bilingual students; however, the advantage cognates might confer has yet to be documented in research. Two questions appear to be salient in terms of bilingual students' ability to identify and transfer cognate information from language to language: (a) Does the student know the meaning of the Spanish word that corresponds to the English word? and (b) Can the student access the Spanish word meaning based on the English orthographic and phonological features? In response to the first question, bilingual students' semantic word knowledge in Spanish and English does not overlap nearly as much as we might expect. Young bilingual children appear to learn many words uniquely in Spanish or English, rather than learning words for the same concept in both languages (Oller, Pearson, & Cobo-Lewis, 2007; Maldonado, 1997; Umbel, Pearson, Fernández, & Oller, 1992). According to Oller et al. (2007), the uneven distribution of bilingual vocabulary knowledge is related to the locus of language acquisition—whether words are learned at home or at school. Bilingual children are more likely to know words related to household activities such as sewing or cooking uniquely in Spanish, while classroom-related words such as *blackboard* are likely to be known exclusively in English.

Despite the incomplete overlap of Spanish–English word knowledge, the frequency analysis suggests that there is a large body of everyday Spanish words that corresponds to a corpus of

general academic vocabulary in English. The frequency analysis revealed that 75% of the AWL headwords are cognates, most of which are more common in Spanish than in English. For example, the AWL word *terminate* is very rare in English, with a ranking of 16697. However, the cognate *terminar* is extremely common in Spanish, with a ranking of 219. Bilingual students are likely to know the meaning of common Spanish words such as *terminar*, providing them with the means to comprehend many academic English words. This simplifies the instructional task substantially. Rather than trying to teach a large number of completely unknown general academic vocabulary words, teachers can focus on the development of bilingual students' strategic skills and morphological and metalinguistic awareness needed to recognize and make use of cognates (Berninger & Nagy, 2008).

The second question—"Can the student access the Spanish word meaning based on the English orthographic and phonological features?"—is of central importance to educators. Numerous studies have demonstrated that bilingual students are more likely to recognize cognates that are orthographically similar (Caramazza & Brones, 1980; Cristoffanini et al., 1986). But research has not determined whether bilingual students notice regular cognate patterns such as words ending in *ent*/*ente* and *ence*/*encia* in English and Spanish or recognize cognates belonging to these patterns more readily. Cognitive psychologists suggest that pattern recognition is a key factor in reasoning and memory (Rips, 1994), and heightened ability to recognize patterns differentiates expert performance from that of novices (Bereiter & Scardamalia, 1993). Bilingual students' well-documented inconsistency in recognizing cognates that they encounter in texts may reflect lack of proficiency in detecting patterns. Helping them become familiar with high-frequency cognate patterns and gain expertise in classifying cognates based on these patterns may make cognates easier to recognize and remember.

Pattern instruction based on AWL headwords may provide an effective vehicle for accelerating bilingual students' vocabulary growth, as each AWL headword represents more than five morphologically related words in English (Coxhead, 2000). Morphological awareness, the ability to notice that words are comprised of meaningful parts, may be particularly important to bilingual students because it facilitates cognate recognition and contributes to reading comprehension achievement, independent of vocabulary knowledge (Hancin-Bhatt & Nagy, 1994; Nagy, Berninger, & Abbott, 2006). The pattern analysis conducted in this study suggests that cognates with similar orthographic features can be grouped for instruction. Systematically teaching students to recognize the orthographic shifts that characterize these patterns may help them develop the ability to identify cognates in texts (Frost, Katz, & Bentin, 1987). Cognates with lesser degrees of overlap, such as those belonging to the Other pattern, may require more instruction. Cross-language transfer is not automatic for many bilingual students, emphasizing the need for increasingly explicit pattern instruction, in relationship to cognate opaqueness. Classroom research based on cognate pattern instruction is needed to determine the efficacy of this approach in schools serving large numbers of bilingual students.

A limitation of the pattern analysis was the use of AWL headwords, rather than the complete AWL corpus. As a result, cognate patterns consisting of words with the inflected endings *ed* and *ing* were underrepresented (only one cognate in the corpus followed either of these patterns). However, a preliminary review of the extended AWL word family list confirms the inclusion of large numbers of inflected words that end in *ed* and *ing*. English-speaking children usually master words with inflected endings before they enter school and acquire words with derivation endings at a later point (Anglin, 1993; Carlisle & Fleming, 2003; Tyler & Nagy, 1989). While it

is not clear which words are mastered first by bilingual students, a reasonable assumption is that bilingual students follow a similar trajectory in learning words with inflected and derivational endings as their English-speaking peers. Teachers of bilingual students may want to emphasize cognate patterns that include words with inflected endings first, before moving on to patterns that include more complex derivational endings such as *ous* (pattern 13) or *ive* (pattern 14).

Cognate transparency is quite complex, and understanding factors that help or inhibit cognate recognition may be important in helping bilingual students access cognates. The transparency analysis demonstrates that a majority of English–Spanish cognates are more similar in terms of orthography than phonology. This finding can be explained by two factors: vowel pronunciation and syllable stress. Spanish vowels are highly regular and rarely correspond to their English equivalents in terms of pronunciation. The cognates *decide*/*decidir* illustrate how differing vowel sounds reduce the phonemic correspondence between cognate pairs. Decide is pronounced [dih-**sahyd**] and *decidir* is pronounced [day-see-**dir**]. Note that there is no correspondence between vowels in this set of words. Even orthographically identical cognates may sound very different in the two languages. For example, the word *animal* is spelled the same in both languages, but the English word is pronounced [**an**-uh-muhl] while the Spanish word is pronounced [ah-nee-**mal**]. Another example is the large group of cognates that end in /tion/ in English and /ción/ or /sión/ in Spanish. These words are orthographically similar, but the final syllable is pronounced [shuhn] in English and [see-**ohn]** in Spanish (e.g., *nation* and *nación* are pronounced [**ney**-shuhn] and [nah-see-**ohn**]).

Nagy et al. (2006) point out that phonological complexity makes it more difficult for students to detect morphological relationships between words. The many phonological differences between English–Spanish cognates revealed by the transparency analysis may help to explain the weak cognate identification skills that Nagy and his colleagues documented in their studies (García & Nagy, 1993; Nagy, García, Durgunoglu, & Hancin-Bhatt, 1992; Nagy et al., 1993).

The transparency analysis also revealed a small, insignificant correlation (.22) between the orthographic and phonological coefficients, suggesting a lack of symmetry in terms of cognate overlap. Inconsistent mappings of sound and spelling across languages may confuse students and inhibit their ability to recognize cognates (Schwartz et al., 2007). This issue may be addressed by teaching bilingual students to recognize phonological shifts between cognate pairs, particularly if they are not literate in Spanish and lack familiarity with Spanish orthography. Prompting students to evaluate whether an English word looks or sounds like a word they know in Spanish is an important facet of cognate instruction (Lubliner & Smetana, 2005).

Cognates differ in multiple dimensions and may be more or less related in terms of orthography, phonology, and semantics. The incomplete semantic correspondence of many cognates is of particular concern to educators and underscores the importance of strategic processes in cross-linguistic transfer. Careful instruction is needed to help bilingual students evaluate cognates in terms of the context in which they appear. The degree to which context supports comprehension and the student's skill at inferring word meaning from context are important factors in comprehension (Jiménez, García, & Pearson, 1996). Polysemous words (words with more than one meaning) are particularly challenging for bilingual students (August et al., 2005). Several studies have demonstrated that bilingual students' word knowledge was limited to only one meaning of polysemous words (August, Carlo, Lively, McLaughlin, & Snow, 2006; August et al., 2005). Nagy, McClure, and Mir (1995) noted that inferring word meaning from context was difficult for the bilingual middle school students they studied, due in part to the large volume of unknown

words in texts. Word difficulty was related to conceptual difficulty, word length, morphological complexity, concreteness or abstractness, richness of context, and word frequency (Nagy et al., 1995). Key factors that facilitate inferring word meaning from context include linguistic knowledge, world knowledge, and strategic knowledge. When linguistic knowledge is limited, heightened world knowledge and strategic knowledge may compensate, helping English learners acquire new English vocabulary from context (Nagy et al., 1995).

Learning to infer word meaning entails a complex interplay of cognate information in both languages and English textual clues. When cognates are closely related in each dimension—orthography, phonology, and semantics—the task of cross-linguistic transfer is facilitated. The greater the differences between cognates, the more challenging the task of inferring English word meaning. It is important that bilingual students acquire tools to infer the meaning of English cognates of varying levels of orthographic and phonological transparency and semantic relatedness. Rather than dismissing words as false cognates when they differ in contemporary meaning, students can be challenged to figure out how partial cognate information can be used to construct meaning of a text. The processes that bilingual students use in identifying cognates and inferring word meaning from partial cognates build cognitive flexibility, a key competency in skilled reading (Berninger & Nagy, 2008). Research has demonstrated that students with weak vocabulary development score significantly higher on reading comprehension tests when they have high levels of cognitive flexibility (Cartwright, Hodgkiss, & Isaac, 2008). Teaching bilingual students flexible cognate use entails breaking down the process of cognate identification, crosschecking context, and determining whether the meaning makes sense. The cognate strategy is similar to other cognitive strategies used to enhance comprehension. Students are likely to benefit from scaffolds such as cue cards, modeling, coaching, and gradual release of responsibility (Lubliner & Smetana, 2005; Rosenshine, 1997).

Bilingual students need to acquire a vast array of words, more quickly than other students, if they are to catch up to their monolingual peers (Ordoñez, Carlo, Snow, & McLaughlin, 2002). Cognates, particularly those that are related to general academic words in English, provide a potentially rich source of vocabulary growth for Spanish–English bilingual students, a population whose underachievement is of serious concern to educators and policy makers (Cuningham & Graham, 2000; Proctor, Carlo, August, & Snow, 2006; Snow & Kim, 2007). When bilingual students learn to infer the meaning of the 426 AWL headword cognates described in this study, they gain access to thousands of general academic words likely to be found in texts and used in academic discourse in a variety of content areas. The analyses included in this paper were designed to help educators understand the nature of English–Spanish cognates so that they can provide a more nuanced approach to cognate instruction.

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