



Published in final edited form as:

Lang Learn Dev. 2016 ; 12(1): 42–59. doi:10.1080/15475441.2014.989051.

Does the Owl Fly out of the Tree or Does the Owl Exit the Tree Flying? How L2 Learners Overcome Their L1 Lexicalization Biases

Lulu Song¹, Rachel Pulverman², Christina Pepe³, Roberta Michnick Golinkoff³, and Kathy Hirsh-Pasek⁴

¹Brooklyn College, City University of New York

²Delaware State University

³University of Delaware

⁴Temple University

Abstract

Learning a language is more than learning its vocabulary and grammar. For example, compared to English, Spanish uses many more path verbs such as *ascender* ('to move upward') and *salir* ('to go out'), and expresses manner of motion optionally. English, in contrast, has many manner verbs (e.g., *run*, *jog*) and expresses path in prepositional phrases (e.g., *out of the barn*). The way in which a language encodes an event is known as its *lexicalization pattern* or *bias*. Using a written sentence elicitation task, we asked whether adult Spanish learners whose L1 was English adopted Spanish lexicalization biases, and what types of L2 exposure facilitated the learning of lexicalization biases. Results showed that advanced, but not intermediate, adult Spanish learners showed a path bias comparable to that found in native speakers of Spanish. Furthermore, study abroad experience is associated with better acquisition of L2 lexicalization biases when describing certain types of events.

Learning a second language requires far more than the acquisition of new words—or even how verbs are conjugated. Knowing that *correr* means 'to run' in Spanish does not provide the learner with adequate information about how it should be used. For example, the English sentence, *The girl ran out of the house*, cannot be directly translated into Spanish. To convey the same meaning, a native Spanish speaker might say, *La chica salió de la casa corriendo*, 'The girl exited the house running.' In fact, in many instances, native Spanish speakers would omit *corriendo* 'running.' However, this does not mean that Spanish speakers never use the verb *run*. When running does not involve crossing a boundary in space, like from inside to outside, the verb *run* can be used (e.g., *El hombre corrió hasta la casa*, 'The man ran up to the house;' Slobin & Hoiting, 1994). The different patterns of encoding motion events in a language are termed lexicalization patterns or biases. Here we adopt the term

Addresses for correspondence: Lulu Song, Department of Early Childhood and Art Education, School of Education, Brooklyn College, City University of New York, 2900 Bedford Ave., Brooklyn, NY 11210 (lsong@brooklyn.cuny.edu); Rachel Pulverman, Department of Psychology, Delaware State University, 1200 N. DuPont Hwy., Dover, DE 19901 (rpulverman@desu.edu).

Portions of this paper were presented at the meeting of the Jean Piaget Society, June, 2006.

lexicalization bias, as it best reflects our focus on individual speaker's tendencies for encoding motion events, rather than broad patterns inherent to a language. The examples above offer a glimpse of the challenges involved in learning to use a second language. The current study investigates how English-speaking college students learning Spanish as a second language overcome L1 lexicalization biases when describing motion events in Spanish.

Lexicalization Biases in English and Spanish

How languages use their verbs, and what concepts they do and do not package, or conflate, in their verbs, may provide us with a heuristic for probing how individuals learning a second language refine their L2 usage. Typologically, English is considered a *manner* language because it often encodes the *manner* of motion (the way in which a figure moves) in the main verb and uses a “satellite” such as a preposition to portray the *path* (the trajectory of the figure; Slobin, 2004a; Talmy, 1985, 2000a,b), as in ‘...*ran out of the house*.’ Here the verb *ran* conflates motion and manner and the prepositional phrase (PP) *out of the house* encodes the path. In contrast, Spanish is a *path* language, frequently conflating motion and path in the main verb while adding an optional gerund to express the manner. Thus, in the Spanish sentence above, the verb *salíó*, meaning ‘exited,’ encodes motion and path and the gerund *corriendo*, meaning ‘running,’ encodes the manner.

Data from elicited speech samples indicate that adult speakers of the two types of languages describe the same event in distinct ways (e.g., Berman & Slobin, 1994; Naigles, Eisenberg, Kako, Highter, & McGraw, 1998; Naigles & Terrazas, 1998; Talmy, 1985). Naigles et al. reported that when describing short video clips of motion events, Spanish-speaking adults used path and manner verbs equally often, producing an average of 3.83 path verbs and 4.58 manner verbs, whereas English-speaking adults produced many more manner verbs ($M = 9.08$) than path verbs ($M = 0.58$). This is not to say that English speakers never use path verbs (e.g., *circle*) or that Spanish speakers never talk about manner; in fact, with some motion events, Spanish speakers prefer to use manner verbs as well (Naigles et al.). Rather, the biases to describe motion events using manner or path verbs are statistical tendencies.

In addition to oral speech, researchers also found lexicalization biases in written narratives and novel translations. For example, compared to Spanish novels, English novels contain a wider variety of manner verbs (Slobin, 1996). Furthermore, manner-language writers tend to provide more manner information than path-language writers (Özçalışkan & Slobin, 2003).

However, the bias to encode manner or path of motion in the main verb in a language is not a clear dichotomy, but rather quite nuanced. Research suggests that path languages such as Spanish treat two types of motion events differently (Naigles et al., 1998; Slobin & Hoiting, 1994). The first type is when the path involves *crossing a boundary*, such as moving from the inside to the outside of an enclosed space, like a house or box, or going from one side of a division or landmark to the other, like crossing a river or passing a sign post. In these cases, the use of a path verb is highly preferred to encode the motion, as there are virtually no prepositions that encode a boundary crossing path.¹ Yet researchers still found exceptions. For example, when describing a short video of a girl sliding down a slide and

plunging into a pool, an apparent vertical boundary crossing event, Spanish speakers overwhelmingly used manner verbs (Naigles et al., 1998). The authors hypothesized that a path verb is required in Spanish only when describing a horizontal boundary event that is explicitly viewed as resultative. Whether a path verb is required or preferred for other boundary events may depend on other factors such as whether the boundary crossing involves the actor's locus of control or is only a byproduct of the actor's exertion.

In the second type of motion event, when *no boundary* is crossed, manner, as well as path verbs are acceptable (e.g., *El hombre corrió hasta la casa*, 'The man ran up to the house'). Here, the running took place entirely outside of the house and did not traverse a boundary. However, although both path and manner verbs are permitted when no boundary is crossed, Spanish speakers still prefer to use path verbs (Naigles et al., 1998). As a result, whereas Spanish, French, and Turkish (path languages) each have fewer than a hundred manner verbs (Slobin, 2004a, 2005), English and other manner languages such as German, Dutch, and Russian each contain several hundred manner verbs (e.g., *run*, *dash*, *jog*, and *gallop*).

Development of L1 Lexicalization Biases

When do L1 learners show the lexicalization biases of their native language? Developmental researchers have examined early lexicalization biases in both language production and comprehension. Some studies examined elicited production of motion verbs in narratives and found that, by age 3, English and Spanish L1 learners already use language-specific syntax when talking about motion events (Sebastián & Slobin, 1994a; see also Berman & Slobin, 1994). For example, Spanish-speaking preschoolers produced more motion verbs without locative detail (a frame more likely to contain path verbs) than their English-speaking counterparts. Similarly, others examined 2- to 3-year-olds' spontaneous production of motion verbs using corpus data and found that the language-specific syntactic distinctions emerged during the latter part of the third year (Hohenstein, Naigles, & Eisenberg, 2004). That is, by the end of the third year, English learning children were more likely to add directional or locative information to their motion verbs (a structure more likely to contain manner verbs) than the Spanish learning children, who were more likely to use bare motion verbs. However, neither study suggests when the *lexical* distinction – differential use of manner and path verbs per se – emerges. Finally, Özçaliskan and Slobin (1999) examined elicited speech samples from children between the ages of 3 and 11 years and adults and reported that, by age 3, the proportion of manner and path verbs English speakers use was 8.25 to 1, already reflecting English biases. Turkish and Spanish speakers appear to show their lexicalization biases in production by the same age as English-speaking children, using about as many path verbs as manner verbs from 3 years of age through adulthood.

How do children acquire the lexicalization bias of their native language? One possibility is that children learn the syntactic distinction between a manner frame (e.g., verb + PP) and a

¹As an example of the difference in the meanings of prepositions, in English, the sentence *The boy ran in the house* can be interpreted in two ways. *In* can be interpreted either as a path (i.e., the boy ran into the house) or as a location (i.e., the boy ran around inside the house). In contrast, the Spanish sentence *El niño corrió en la casa* 'The boy ran in the house' can only be interpreted as the boy running around inside the house. *En* 'in' has only the locational meaning and no preposition exists to express the path 'into.' Therefore, the only way to express the idea that the boy ran into the house is with a path verb, as in *El niño entro a la casa corriendo* 'The boy entered the house running.'

path frame (e.g., bare verb) first, which helps children acquire the lexical distinction later through “syntactic bootstrapping” (Gleitman, 1990; Hohenstein et al., 2004; Naigles & Terrazas, 1998). By frequently encountering the manner frame and thereby learning increasingly more manner verbs, English-speaking children begin to form the lexicalization bias to use manner verbs when referring to motion events. On the other hand, Spanish-learning children experience predominantly path frames and thereby learn a large number of path verbs that lead them to develop the Spanish lexicalization bias. There has been some evidence from both early spontaneous speech and experimental studies of novel verb interpretation that lends support to this hypothesis (Hohenstein et al., 2004; Hohenstein, 2005). In comprehension, Maguire et al. (2010) found that 2- and 2½-year-old children learning English and Japanese (a path language that encodes path in the main verb and manner in the subordinate verb) both preferred to map a novel verb onto path rather than manner, but showed language-specific mapping by age three.

How Do L2 Learners Acquire L1 Lexicalization Biases?

Adult L2 learners rarely show target-like performance in general even after years of instruction or living in the L2 country (Bley-Vroman, 1988; Johnson & Newport, 1989). According to Slobin’s (1996) “thinking for speaking” hypothesis, in acquiring a native language, children pay attention to the specific dimensions of experience (e.g., manner or path of motion events) that are represented and expressed through the grammaticized categories of the native language. As we learn the native language, it becomes “exceptionally difficult for us to be retrained” (Slobin, 1996, p. 91). This then presents a challenge for adult L2 learners whose L1 is typologically different than the L2 in terms of encoding motion events. L2 learners must learn (a) which particular aspects of a motion event must be attended to in the context of L2, and (b) how these semantic components are mapped onto specific L2 forms (Cadierno, 2008). The predominance of manner verbs in English and their frequent usage might make it hard for a native English speaker learning Spanish to adopt Spanish lexicalization biases. However, there is evidence that adults’ lexicalization biases are indeed plastic.

In one study, English-speaking adults were taught a total of 12 novel nonce verbs consisting of manner and/or path verbs during an experiment session (Shafto, Havasi, & Snedeker, 2014). For each verb, five short video clips illustrated the novel events that could be named by that verb. If the novel verb was a path verb all five events involved the same path but different manners. If the novel verb was a manner verb, the reverse was true. If lexicalization biases were plastic, the English-speaking participants’ bias to construe a novel verb as a manner verb would be weakened and the bias to construe a novel verb as a path verb would be strengthened as they encountered more path verbs in the experiment. Results showed that the English-speaking adults’ tendency to construe a novel verb as a path verb increased after learning a series of path verbs.

In fact, other studies that examined transfer effects of L2 to L1 in the domain of lexicalization biases in encoding motion events have shown that established typological patterns in L1 might be influenced by patterns acquired in L2. For example, Hohenstein, Eisenberg and Naigles (2006) found that when describing motion events, Spanish-English

bilingual adults used more manner verbs in Spanish than Spanish monolinguals, and used more path verbs in English than did English monolinguals. Similarly, Brown and Gullberg (2010) found that native Japanese speakers with intermediate knowledge of English frequently used adverbials to express path information of motion events, a tendency found in monolingual English speakers but not in monolingual Japanese speakers.

Although still rather scarce, research has begun to look specifically at adult L2 learners' ability to adopt contrastive L2 lexicalization biases. The findings are largely two-fold. First, adult L2 learners, especially those at the advanced levels, appear to produce L2 using the L2 lexicalization bias, at least in some aspects. For example, Cadierno (2004) examined how intermediate and advanced Danish (L1; manner language) learners of Spanish narrated motion events in the wordless book, *Frog, where are you?* (Mayer, 1969) in both Spanish and Danish using a written task. The results showed that contrary to what was expected, the Danish learners of Spanish did not use event conflation (i.e., the inclusion of the different composites of locative trajectories within a single clause, e.g., *The deer threw the boy off over a cliff into the water*), a construction not easily allowed in Spanish but common in Danish, in their Spanish narratives. The proportions of Danish learners who provided descriptions of trajectories (more in line with a manner bias) in Spanish and of those who provided static descriptions (more in line with a path bias) matched those found in a native Spanish-speaking control group. In a subsequent study, Cadierno and Ruiz (2006) found that advanced Danish learners of Spanish did not differ from the Spanish native speakers in the amount of use of manner verbs. Similarly, Navarro and Nicoladis (2005) found that advanced speakers of Spanish whose native language was English did not differ from Spanish native speakers with respect to the amount of path verbs used.

Second, adult L2 learners, especially those at the initial and intermediate stages, do appear to be influenced by their L1 lexicalization biases when producing, comprehending, or making grammatical judgments of L2. For example, Cadierno (2004) found that the Danish learners provided more complex and elaborated path descriptions (sometimes using inaccurate "satellization"; e.g., **El niño fue arriba de una roca*, 'The boy went on top of a rock') than the native Spanish speakers. Cadierno and Ruiz (2006) found that even at the advanced levels, the Danish learners of Spanish still produced inaccurate expressions that used manner verbs to describe boundary crossing events. With respect to comprehension, Inagaki (2002) showed that native Japanese speakers learning English as L2 consistently failed to recognize a directional reading of English manner verbs with locational/directional PPs such as *John swam under the bridge*, as manner verbs are typically not used together with directional PPs in Japanese. This contrast in lexicalization biases between English and Japanese appeared to also result in English-speaking learners of Japanese accepting manner verbs with goal PPs such as **John-wa gakkoo-ni aruita* 'John walked to school' even though they are not permitted in Japanese (Inagaki, 2001; see also Montrul, 2001, for a judgment task using English and Spanish). Finally, studies on the simultaneous use of gesture and speech of L2 learners suggest that even though advanced L2 learners may not show lexicalization errors in their spoken language, they may still transfer their "manual accent" (i.e., L1-specific gestural pattern) to an L2 (e.g., Choi, & Lantolf, 2008; Kellerman & Van Hoof, 2003; Negueruela, Lantolf, Jordan, & Gelabert, 2004; Stam, 2006).

In summary, although the studies are still relatively few, there are empirical data to suggest that adult L2 learners (1) at the advanced levels can adopt L2 lexicalization biases that are in contrast to their L1 biases when writing or speaking L2, and (2) at the initial and intermediate levels may show transfer of their L1 biases when producing L2. However, while these findings suggest a link between proficiency levels or exposure (which are highly related) and adoption of L2 lexicalization biases, there have been no data that directly and statistically test this link. Examining this link will advance our understanding of the process of acquiring L2 lexicalization biases.

The Present Study

The present study explores how L2 learners in college L2 programs acquire the lexicalization biases of a second language. Can L2 learners override the biases of their L1 when they fall into different categories? What elements, if any, in L2 education assist learners in acquiring the lexicalization biases that L1 learners get “for free?”

How can we examine the learning of L2 biases? Berman and Slobin (1994) developed a way to examine lexicalization biases in different languages (see also Slobin, 2004b). They asked children to provide narratives based on the children’s wordless picture book *Frog, where are you?* (Mayer, 1969; see Appendix for example pictures). While the plot of the story is clear from the pictures, the absence of words allows the “reader” to describe the pictures using their language’s lexicalization biases. Take the owl scene (Appendix, Picture 3), for example. Slobin (2004b) found that speakers of *path* languages hardly ever made reference to the way in which the owl emerges from the hole in the tree. Instead, they used the main verb to encode the path, e.g., *salir* (‘to exit’). On the other hand, speakers of *manner* languages produced utterances in which the main verb encoded the manner and a preposition encoded the path (e.g., *flew out of the tree*). Here, rather than asking for narratives spoken to an interlocutor, we asked L2 learners to write descriptions of four of the pictures involving both boundary crossing and non-boundary crossing motion. We reasoned that untimed written descriptions would maximize L2 learners’ performance by allowing them to make corrections.

Using this method we asked three questions. First, do native English speakers learning Spanish as an L2 acquire the lexicalization biases of Spanish in the absence of explicit instruction on this topic? Lexicalization biases were quantified as the proportion of path verbs used to describe the pictures (path verbs divided by path verbs plus manner verbs). We compared the proportion of path verbs between intermediate and advanced learners of Spanish and native Spanish speaking 3- and 12-year-olds. A higher proportion of path verbs would suggest that the path bias was stronger. Previous studies have shown that by age 3 children begin to show language-specific lexicalization biases in their native language production (e.g., Hohenstein et al., 2004; Özcaliskan & Slobin, 1999; Sebastián & Slobin, 1994a). Thus, we expected both the native 3- and 12-year-old Spanish-speaking children to exhibit a path bias that would be similar to Spanish-speaking adults. In other words, we expected the Spanish-speaking children to show a target-like lexicalization bias. Questions were whether the L2 learners would display a comparable path bias and whether the advanced learners would show a stronger path bias than the intermediate learners. The 3-

year-old native Spanish speaking children would also allow us to compare the lexicalization biases between the L1 and L2 speakers independent of their vocabulary or grammatical skills.

Second, what is the process by which adult L2 learners acquire the Spanish lexicalization biases? If the use of a path verb is obligatory for most boundary crossing events in Spanish due to the lack of Spanish prepositions encoding boundary crossing paths, perhaps L2 learners first learn to use path verbs for such events and later extend this bias to non-boundary crossing events. In a way, the boundary crossing events may serve as a bootstrap for the acquisition of a path bias. Therefore, we expected L2 learners (more so for the intermediate than the advanced learners) to show a difference in the use of path verbs between the two types of events. However, for the native speakers, because a path verb is likely to be used for both types of events, we did not expect to see such a difference.

Finally, how much and what kind of exposure is needed to acquire the Spanish lexicalization biases without explicit instruction? We expected that L2 exposure would have an effect on the acquisition of L2 lexicalization biases such that advanced L2 learners would be more likely to show a path bias than intermediate learners. We also examined the effect of a particular type of exposure involved in some college L2 curricula—study abroad programs. L2 students who participate in such programs typically spend an extended period of time in a country where the L2 is spoken natively. Given the intensity of exposure, we expected that controlling for proficiency (i.e., course level), students who participated in such programs for a relatively long period of time would more likely show a path bias than those who did not.

Method

Participants

The sample contained 50 university students, of which 26 (7 male) were enrolled in a 300-level Spanish language class (referred to as the “intermediate” group) and 24 (4 male) in a 400-level Spanish language class (the “advanced” group). There were 16 students who participated but were not included in the final sample because they were exposed to Spanish at home ($n = 5$), spoke languages other than English at home ($n = 8$), or were “too proficient in Spanish” based on information provided on their language surveys ($n = 3$). The 300-level group had taken, on average, 5.46 ($SD = 2.66$) Spanish courses at the time of the study in their college career; the 400-level group had taken, on average, 7.67 ($SD = 2.57$) Spanish courses. All of the 50 students in the final sample spoke English as their native language and learned Spanish as a second language.

Sentence production data from frog story narratives in the CHILDES database (Berman & Slobin, 1994; MacWhinney, 2000) were compared to the L2 learners tested here. The transcripts were from native Spanish-speaking children (11 three-year-olds from the Sebastián corpus and 10 twelve-year-olds from the Aguilar corpus; Sebastián & Slobin, 1994a, b). Only the portions of the transcripts corresponding to the same pictures as those used in the current study were analyzed.

Thus, there were four participant groups: 1) intermediate L2 learners, 2) advanced L2 learners, 3) 3-year-old Spanish-speaking children, and 4) 12-year-old Spanish-speaking children.

Materials and Procedure

The task was completed during the participants' regular class time (about 20 minutes). All students were informed of the procedure and their free choice of participation before the study began. Having been informed, all students in both classes chose to participate.

All participants from both the 300- and the 400-level classes were first given a brief language survey that included questions regarding their experiences with Spanish and any other languages (i.e., languages spoken in the home, age of introduction to Spanish, travel and study abroad experience, and Spanish classes taken).

Then participants were asked to "read" through a photocopy of the *entire* children's picture book *Frog, Where are you?* (Mayer, 1969), which has 29 wordless pages. They were then to write a brief description of the four pictures selected (see Appendix) in Spanish. Specifically, they were asked to write "what the main characters are doing" in each of the four pictures in one or two complete Spanish sentences. These instructions were in English, provided both orally and in writing. Pictures 1 and 3 contained boundary crossing motion events (e.g., out of the jar or tree) and non-boundary crossing events (e.g., chasing, fleeing, falling) and Pictures 2 and 4 contained only non-boundary crossing motion events (e.g., up the tree or lifted in the deer's antlers).

Coding

Only the motion verbs were coded, omitting non-motion verbs (e.g., mental verbs [think], result verbs [break], etc.) and verbs that were ambiguous (e.g., *montar* can mean 'get onto/mount' [path] or 'ride' [manner]). When participants used multiple motion verbs in a description of a single picture, each of the verbs was coded, so many participants' data included more than four verbs. Verbs that encoded the direction of the movement (e.g., *salir* 'to leave', *escapar* 'to escape', *caer* 'to fall') were considered path verbs while verbs that encoded how the motion was performed (e.g., *correr* 'to run', *volar* 'to fly', *saltar* 'to jump') were considered manner verbs. The grammaticality of the verbs was not considered as our concern was with verb type. Table 1 shows examples of the sentences produced.

All responses were coded by a native Spanish-English bilingual, with twenty percent of the responses recoded by another native Spanish speaker (i.e., the reliability coder). Both were blind to the groups from which the responses came. Agreement between coders was 97%. Subsequent recoding of all data by a native English speaker highly proficient in Spanish was then compared against the original coder (87% agreement), and discrepancies were resolved through discussion with another native Spanish speaker.

For each individual, the total number (tokens) of path and manner verbs across the responses to all four pictures was tallied. Also coded was the mean length of utterance (MLU) measured in words for each individual. In addition to providing a control for the amount of

production, MLU also offered a gauge of how the L2 learners' general competency in L2 compared to the native children.

Results

How Did the L2 Learners and Native Children Describe the Events?

The types and tokens of motion verbs used by the intermediate and advanced L2 learners and the Spanish-speaking children are shown in Table 2. The intermediate and advanced L2 learners together used similar numbers of Spanish path verb *types* as the native Spanish-speaking children (17 and 15 path verb types, respectively). The L2 learners used 4 manner verb types while the native children used only 1 (*correr* 'run'). Eight of the path verb types were shared by the L1 and L2 speakers, as was the manner verb *correr*. The L2 learners used 7 tokens of *volar* 'fly' (or an incorrect variant) and 3 tokens of *saltar* 'jump' to describe the owl's manner of motion in Picture 3 and the frog's manner of motion in Picture 1 respectively, whereas the Spanish-speaking children made no reference to these manners at all. The use of *volar* and *saltar* seemed to reflect an attempt to translate English descriptions directly into Spanish.

Indeed, as shown in Table 1, some of the responses given by the intermediate and advanced L2 learners follow the lexicalization biases of Spanish. Other responses, however, appear to use the lexicalization biases of English (e.g., *El búho vuela fuera del árbol*, an attempt at saying 'The owl **flies out** of the tree,' using a manner verb and a path PP). To express the same idea, a native 12-year-old said, *Salió un búho*, 'An owl **exited**,' conflating path in the verb and omitting the manner and the source of the owl's flight (the tree). Advanced learners were more apt to use the lexicalization biases of Spanish than intermediate learners.

Did L2 Learners Differ from Spanish-speaking Children in How They Described the Pictures?

Descriptive statistics are presented in Table 3. We examined the *proportion* of path verbs out of total motion verbs (i.e., sum of path and manner verbs) to determine whether the path bias was as strong among the L2 learners as among the native speakers. The proportion of path verbs provided a more accurate measure of the lexicalization bias than raw frequencies of path or manner verbs, as it controlled for the total number of motion verbs the participants produced.

We also separated the participants' descriptions of boundary crossing events (the frog's action as it climbs out of the jar; the owl's action as it flies out of the hole in the tree; and any other descriptions using clear-cut boundary crossing terms such as *salir* 'exit') in which path verbs are obligatory from the descriptions of non-boundary crossing events (all other motion events) in which path verbs are preferred but not obligatory. Each group's proportions of path verbs for the two types of events are shown in Figure 1.

A two-way ANOVA with event type (boundary crossing vs. non-boundary crossing) as the within-subjects variable and group (intermediate Spanish learners versus advanced Spanish learners versus native 3-year-olds versus native 12-year-olds) as the between-subjects variable was conducted on the proportion of path verbs. A significant group difference

emerged, $F(3, 64) = 7.74, p < .001, \eta_p^2 = .27, \text{power} = .98$. Post-hoc comparisons (Tukey HSD) revealed that the intermediate learners had on average significantly lower proportions of path verbs than each of the other groups (p 's $< .024$). No significant differences were found between the 3-year-olds, the 12-year-olds, and the advanced L2 learners (p 's $> .223$). The Event Type \times Group interaction was marginally significant, $F(3, 64) = 2.49, p = .068, \eta_p^2 = .11, \text{power} = .59$, suggesting that the group difference varied by event type (see Figure 1). We explored this trend further based on our hypothesis in the next section.

We also examined the MLU in words of each group because MLU might have been a limiting factor for the intermediate L2 learners. A one-way ANOVA showed a significant group effect, $F(3, 67) = 21.61, p < .001, \eta_p^2 = 0.49, \text{power} = .94$. However, post-hoc comparisons revealed that the 3-year-old Spanish speakers produced shorter sentences than each of the other three groups, p 's $< .001$. In other words, the MLU of the intermediate and advanced L2 learners were comparable to that of the 12-year-old Spanish speakers. This analysis indicates that a path bias is independent of sentence length as measured by MLU in words. Thus, although the intermediate L2 learners produced sentences of similar length as the other groups, they showed a weaker path bias in comparison.

Did L2 Learners and Native Speakers Differ in How They Encoded the Boundary Crossing and Non-Boundary Crossing Events?

Inspection of Figure 1 suggests that the intermediate L2 learners appeared to show a larger difference for the two types of events than the other groups, although the interaction was only marginally significant (reported above), probably due to limited power. To further explore this trend, planned paired-samples, two-tailed t -tests comparing the proportion of path verbs between the two event types were conducted within each of the four groups. All of the groups used significantly higher proportions of path verbs to describe boundary crossing events than non-boundary crossing events (p 's $< .039$). Thus, all groups used path verbs less often in non-obligatory contexts than in obligatory ones.

Next, we conducted post-hoc tests (Tukey HSD) comparing the proportion of path verbs across the four groups separately for the boundary crossing and non-boundary crossing events. For the boundary crossing events, no significant differences were found among the groups (p 's $> .527$). For the non-boundary crossing events, the intermediate students used a significantly lower proportion of path verbs than each of the other groups (p 's $< .035$), and the other groups did not differ from one another (p 's $> .379$). In other words, all groups showed comparable path preferences in obligatory contexts, but the intermediate students used a lower proportion of path verbs than the other groups in non-obligatory contexts.

What Types of Exposure Contributed to the Adoption of the Spanish Lexicalization Biases?

The intermediate L2 learners deviated from the native Spanish speakers in their proportion of path verbs in non-boundary crossing events, while the advanced L2 learners resembled the native speakers when describing both event types. Thus, an obvious answer to the increased target-like performance of the L2 advanced speakers might be the number of Spanish classes a student has taken. However, at the university the participants attended,

study abroad programs flourish during the winter and summer short semesters (4–5 weeks in length), and during the regular semesters (10 weeks or longer). There were 23 students in our sample who had not participated in any study abroad programs (10 intermediate and 13 advanced learners), 20 students who had studied abroad for one short semester (13 intermediate and 7 advanced learners), and 7 who had studied abroad during a regular semester (3 intermediate and 4 advanced learners). Thus, we divided the L2 learners into three groups based on whether they had studied abroad for a long semester (the “long” group), a short semester (the “short” group), or not at all (the “none” group). Note that there were both intermediate and advanced level students in all three study abroad groups. Mean proportions of path verbs within each study abroad group are presented in Figure 2.

The length of time students studied abroad was regressed on the *proportion of path verbs* using a two-step sequential multiple regression analysis. At step 1, we entered participants’ class level (intermediate or advanced). At step 2, we entered participants’ study abroad length (none, short, or long) to test whether study abroad experience had any additive effect on the dependent variables. That is, we tested the independent effects of class level and study abroad experience while controlling for the effect of either factor in the model. Since our previous analyses showed differences based on event type, this regression was run separately for boundary crossing events and non-boundary crossing events.

We first looked at the boundary crossing events. At the bivariate level, the students’ study abroad length was significantly correlated with the proportion of path verbs they used ($r = .335, p = .009$), but the level of Spanish classes students were taking was not ($r = .030, p = .419$). Study abroad length and class level did not correlate with each other ($r = -.056, p = .349$). When entered at step 1, students’ class level uniquely accounted for only .1% of the variance of the dependent variable and was not significant, $F(1, 48) < 1$. At step 2, study abroad length accounted for an additional, and significant, 11.4% of the variance, $F_{chg}(1, 47) = 6.04, p = .018$. Thus, more study abroad experience predicted greater proportions of path verbs produced by L2 learners in boundary crossing events above and beyond their class level. Class level did not predict path verb use in boundary crossing events. For more statistical details of this model, see Table 4.

Next, we analyzed the non-boundary crossing events. At the bivariate level, the class level was significantly correlated with the proportion of path verbs used ($r = .392, p = .003$), but the study abroad length was not ($r = .132, p = .183$). When entered at step 1, students’ class level uniquely accounted for 15.4% of the variance of the dependent variable and was highly significant, $F(1, 47) = 8.54, p = .005$. At step 2, study abroad length accounted for an additional 2.4% of the variance and was not significant: $F_{chg}(1, 46) = 1.33, p = .255$. Thus, in non-boundary crossing events, higher class level predicted greater proportions of path verbs produced by L2 learners but study abroad experience did not predict path verb use. For more statistical details of this model, see Table 4.

Discussion

The current study examined whether and how students taught an L2 at the college level learn the lexicalization biases of the L2. This is an important question in L2 learning, and

especially crucial when the lexicalization biases of the L1 conflict with the L2, as they do between English and Spanish. Intermediate and advanced English-speaking adult learners of Spanish were asked to describe four scenes involving motion events in a wordless children's picture book. Their responses were compared to those of native Spanish-speaking 3-year-olds just learning their L1 and 12-year-old Spanish speakers who have already acquired their native language lexicalization biases. This study yielded evidence consistent with a growing literature that L2 learners do eventually adopt competing lexicalization biases in an L2 (e.g., Cadierno, 2004, 2008; Cadierno & Ruiz, 2006; Navarro & Nicoladis, 2005). More notably, this study advances our understanding of two factors that impact L2 learners' adoption of L2 lexicalization biases by evaluating the effects of both proficiency level (as indexed by class level) and study abroad experience.

Specifically, three major findings emerged. First, whereas the advanced L2 learners showed the Spanish lexicalization bias similar to the native Spanish-speaking children, the intermediate L2 learners still showed significant differences from the native speakers, at least for the non-boundary crossing events. Second, both the intermediate and advanced L2 learners were more likely to use a path verb when it was obligatory (in boundary crossing situations) than when it was not obligatory but still preferred by native speakers (in non-boundary crossing situations). Finally, both class level and study abroad experience contributed to L2 learners' adoption of Spanish lexicalization biases, but in different ways—class level mattered for non-boundary crossing events, while study abroad experience mattered for boundary crossing events.

Do Adult L2 Learners Adopt New Lexicalization Biases?

The four groups all used comparable proportions of path verbs when describing boundary crossing events (when the use of path verbs is typically required). But there was a weaker path bias among the intermediate learners as compared to the other groups when describing non-boundary crossing events (when the use of path verbs is preferred but not required). Also, like the native speakers, both the intermediate and advanced learners produced path verbs more often for the boundary crossing than the non-boundary crossing events. Note, however, that these results do not mean that the advanced L2 learners obtained target-like mastery of Spanish overall. Our coding did not reflect the grammaticality of their productions so we cannot comment on whether their path verbs were used correctly. Rather, the results suggest that the advanced learners' descriptions resembled the native speakers' responses in terms of lexicalization bias, whereas the intermediate L2 learners' descriptions still somewhat reflected the English (L1) lexicalization bias, showing a tendency to encode the manner as often as the path in the verb in contexts where that was an acceptable option. The influence of the L1 bias was also apparent in a small number of boundary crossing descriptions that were apparent translations of typical English sentences, using manner verbs and attempting to encode paths (unacceptably) in prepositional phrases. Thus, adult L2 learners can acquire contrasting L2 lexicalization biases, but it takes time. Target-like lexicalization is not typically achieved before reaching an advanced level of study.

By What Process do Adult L2 Learners Adopt New Lexicalization Biases?

L2 learners could have been explicitly instructed on the topic of lexicalization biases. However, Spanish classes, even at the advanced levels, do not typically include instruction in the contrasting lexicalization biases of English and Spanish. Examination of two commonly used grammar textbooks for intermediate and advanced college-level Spanish courses (Gill, Wegmann, & Mendez-Faith, 2006; Stillman & Gordon, 1998) revealed no mention of Spanish lexicalization biases or how they differ from English. Anecdotal evidence provided by a professor of L2 pedagogy and author of four Spanish textbooks indicated that, “Introductory Spanish textbooks only target the most salient morphological and syntactic features of the language. Fine semantic distinctions are usually not covered until the advanced levels, and even then, comparative approaches are the exception rather than the norm” (J. Cubillos, 2009, personal communication). Therefore, students must “discover” these patterns solely from their readings and limited language input.

How does the learning of L2 lexicalization biases take place in the absence of explicit instruction? It is helpful to first consider how L1 learners detect the verb lexicalization biases of their native language (Maguire et al., 2010). One possibility is that L1 learners spontaneously detect statistical patterns in the language input (Saffran, 2003), noting the relative frequency of manner and path verbs overall and in different semantic and syntactic environments. L2 learners may compute these statistical patterns without conscious awareness. Saffran, Newport, Aslin, Tunick, and Barrueco (1997) showed that, without being told to attend to a repeating auditory stimulus in an artificial language, adults could recognize “words” from the language compared to “part words” not in the attested language but composed of the same syllables. Frost, Siegelman, Narkiss, and Afek (2013) reported that adult L2 learners of Hebrew who performed better on a visual-statistical-learning task were better at detecting the implicit Semitic structure embedded in Hebrew words.

Another possibility is that boundary crossing events may serve as a bootstrap for L2 learners to adopt the Spanish lexicalization bias. For boundary crossing events, the use of a path verb is typically required, as prepositions denoting such paths are not available in Spanish. It has been proposed that this constraint on the lexicon may explain why Spanish is a path language—the lack of boundary crossing path prepositions forces the frequent use of path verbs (Hohenstein et al., 2004; Naigles & Terrazas, 1998; see also Beavers, Levin, & Tham, 2010, for a formal linguistic proposal). Thus, when encountering boundary crossing events in their L2, English-speaking L2 learners cannot use their L1 lexicalization bias to attempt direct, word-to-word translations. Instead, they would be forced to choose an appropriate Spanish verb—a path verb—to convey the meaning. Our results are consistent with this possibility. We found that neither the intermediate nor the advanced L2 learners differed from the native speakers when describing boundary crossing events, but the intermediate learners used path verbs significantly less than all three other groups when describing non-boundary crossing events. Perhaps the intermediate students were more target-like for the boundary crossing events because they could not produce grammatical constructions using manner verbs in Spanish for these events. For the non-boundary crossing events, which permitted manner verbs but still tended to elicit path verbs from native Spanish speakers, the intermediate L2 learners’ L1 influence surfaced. Eventually, however, the L2 learners should

resemble native speakers in both obligatory and non-obligatory contexts. Indeed, we found the advanced L2 learners to be target-like in both types of events.

Do Different Types of Exposure Matter?

We found that both proficiency as indicated by class level and the length of study abroad contributed significantly to the adoption of L2 lexicalization biases, but for different event types. For boundary crossing events, study abroad experience made a contribution, but proficiency was not significant in the model. This is not to say that L2 learners do not learn appropriate verb usage for boundary crossing events from classroom experience. To the contrary, both the intermediate and the advanced students used path verbs over 90 percent of the time in these contexts, and even those with no study abroad experience used path verbs over 80 percent of the time. Perhaps classroom experience does make a difference, but only at the introductory levels. What is clear from the current study is that, by the time they reach the intermediate level, L2 Spanish learners are nearly target-like in their use of motion verbs when describing boundary crossing events. However, there is still some room for improvement, and this is where study abroad plays a role.

While those who had not studied abroad used path verbs about 83 percent of the time, those who had spent a short or long time abroad used path verbs 97.5 and 100 percent of the time, respectively. In fact, across all of the students who had studied abroad, only one manner verb token was used to describe a boundary crossing event. Thus, when describing a type of motion event in which a path verb is usually obligatory, even a short study abroad experience can bridge the gap between getting it right most of the time versus getting it right all of the time. It is not surprising that study abroad has such an impact, since this type of experience exposes a learner to massive amounts of input from native speakers who provide models of the appropriate linguistic structure. The L2 learner is maximally immersed in the language, compared to the limited amount of time spent in the classroom each week. Logically, the more exposure a learner receives, the better these patterns will be extracted and implemented by the learner.

For non-boundary crossing events, class level significantly contributed to the proportion of path verbs used, but time spent studying abroad did not. Unlike the boundary crossing events, intermediate level students' path verb use in these optional contexts looked nothing like the performance of native speakers. In fact, the intermediate students used path verbs and manner verbs roughly equally, suggesting that they had not yet learned that path verbs should be preferred in these contexts. In contrast, the advanced students' performance resembled that of the native 3-year-olds. Much room for improvement remains by the time students reach the intermediate level, and they become more target-like as they take more classes.

The more surprising finding was that time spent studying abroad was not significant in this model. However, inspection of Figure 2 suggests that a long study abroad experience may be related to greater path verb use in non-boundary crossing events. Since only seven of our participants spent a full semester abroad, our analysis may have simply lacked the necessary power to find a significant effect. It is clear, however, that a short study abroad experience does not appear to predict an increase in path verb use for non-boundary crossing events.

Perhaps a great deal of exposure is necessary to adopt an L2 lexicalization bias when the L1 pattern is acceptable – though not preferred – in the L2. Yet based on the average time students spend using their L2 during a short stay abroad (553.67 minutes per day; Llanes & Muñoz, 2009), we estimate that studying abroad for a short semester equates to more L2 exposure than the average amount of time the advanced students had spent in class (323 hours of L2 use in 5 weeks abroad versus 268 hours of L2 class in 7.67 semesters).

Clearly, L2 speakers need more than just exposure to L2. Exposure per se may be insufficient if the meaning-form mappings are complex and contrastive in L1 and L2 (Cadierno, 2008; Ellis, 2004). Furthermore, L2 learners have the extra task of *overcoming* their long-standing L1 bias. To help L2 learners overcome the L1 biases, L2 education might be more effective were it to highlight the lexicalization biases in the L2 and contrast them with those in L1 through explicit instruction or enhanced discovery learning (which involves providing feedback, worked examples and scaffolding; see Alfieri et al., 2011, for a discussion).

Why are boundary crossing and non-boundary crossing events so different in L2 learning?

The differences in L2 path verb use between boundary crossing and non-boundary crossing events might be best explained as a difference between rule learning versus probabilistic learning. The rule that the vast majority of boundary crossing events require path verbs is relatively easy for L2 learners to detect for two reasons. First, speakers are forced to express path via the verb because boundary crossing path prepositions do not exist, and second, the use of path verbs in the input for boundary crossing events is virtually 100 percent.

In contrast, to describe non-boundary crossing events, probabilistic tendencies are the only indication that path verbs should be preferred. For these events, using a manner verb and path preposition (the L1 pattern) is acceptable, if not target-like. Although there is evidence that adults can find statistical patterns in linguistic input with relatively little exposure (Saffran et al., 1997), to do so requires at least noticing the relevant features for which frequencies must be implicitly tabulated. Research on linguistic relativity has shown that, while there are no differences in attention to and categorization of manner and path between speakers of English and Greek (a path language) in *non-linguistic* tasks (but see Kersten et al., 2010), language-specific attentional preferences are evident when language is incorporated in similar tasks (Papafragou, Hulbert, & Trueswell, 2008; Papafragou & Selimis, 2010). Thus, perhaps “thinking for speaking” (Slobin, 1996) inhibits L2 learners from noticing the statistical tendencies necessary for overcoming their L1 lexicalization biases. In the moment of composing their sentences, it may be difficult to access an L2 language’s lexicalization biases.

Eventually L2 learners acquire these lexicalization biases, possibly because increasing fluency allows L2 speakers the cognitive capacity to notice their L2 statistical tendencies. Kersten et al. (2010) found that bilingual Spanish/English speakers who were exposed to their L2 (English) after age 5 could categorize manner similarly to native English speakers when tested in English. This suggests that fluent L2 speakers can attend to motion events in a way that should allow them to use statistics to adopt L2 lexicalization biases, but further research is needed to determine what degree of fluency is required.

Limitations of the Present Study

Although the present study advances our understanding of how L2 learners acquire the L2's lexicalization biases, it contains several limitations. First, several differences in the task completed by the L1 and L2 participants may have weakened our results. We asked the L2 participants to produce written descriptions of four pictures selected from a book, whereas the native Spanish-speaking children were asked to narrate the whole story aloud. Task differences may have enhanced the L2 learners' performance, as previous research has shown more target-like performance in written than in oral tasks (e.g., Tarone, 1983).

Another concern is that the L2 learners' apparent adoption of L2 lexicalization biases may have been an artifact of restricted lexical availability. It is possible that the L2 learners resorted to the simple path verbs in Spanish because they did not know the Spanish manner verbs corresponding to the descriptive manner verbs they would use in English (e.g., creep). However, as the data on participants' path and manner verb types and tokens indicate, the L2 learners used similar numbers of path verb types and more manner verb types as compared to the native speakers. Thus, the L2 learners seemed to have a sufficient lexical store to describe these pictures. Also, the L2 learners used manner verbs such as *volar* 'fly' and *saltar* 'jump' that did not appear in native speakers' narratives. That is, instead of resorting to an easy path verb, *salir* 'go out,' some L2 learners resorted to an easy manner verb, *saltar* 'jump.' These data suggest that although we cannot rule out the possibility, restrictions in lexical availability do not seem to drive the results.

Additionally, although the L2 learners were given the opportunity to "read" the entire book first, it was possible that describing isolated pictures presented a different discourse context than narrating the whole story. Nevertheless, our results that the L2 learners at the advanced levels displayed L2 lexicalization biases comparable to native speakers are consistent with previous studies involving narrating the whole story (e.g., Cadierno, 2004). Also, the current small sample sizes of both L1 and L2 speakers and the use of only four pictures limit our ability to make generalizations. The students who had spent different periods of time in a study abroad program may differ from the rest of the students in other ways (e.g., motivation) that contribute to the results. Additionally, class level and time spent abroad are only two of many factors that likely contribute to L2 proficiency, and aspects of proficiency that have not yet been explored may be key factors in understanding the acquisition of L2 lexicalization biases. Furthermore, to draw broad conclusions about how L2 learners adopt L2 lexicalization biases, it is important to tap a range of different types of paths and manners.

Conclusion

To achieve target-like performance, L2 learners of Spanish whose L1 is English have to overcome the English lexicalization bias of using manner verbs to describe motion events and adopt the Spanish bias of using path verbs. The current study showed that English-speaking advanced learners of Spanish who had taken on average eight college-level courses used path verbs to the same extent as the Spanish native speakers. Yet the intermediate learners, who had taken on average five college-level courses, still showed influence from English, using a higher proportion of manner verbs than the Spanish native speakers when

describing non-boundary crossing events. Besides coursework, study abroad experience also contributed to more target-like lexicalization biases. These data demonstrate the independent roles of different types of exposure on the learning of L2 lexicalization biases. Future research is needed to shed light on the potential of enhancing L2 learning in the classroom by incorporating explicit instruction of L2 lexicalization biases.

Acknowledgments

The authors wish to thank Dr. Hans-Joerg Busch, Dr. Lee Glen, and Dr. Stacey Hendrix and their classes for their participation in this study as well as Amanda Brandone and Weiyi Ma for their assistance with analyses. NICHD grant 5R01HD050199 and NSF grant BCS-0642529 to the fourth and fifth authors supported this work.

Appendix

Descriptions of the four pictures from *Frog, where are you* that were used in the current study.

Picture 1: In a bedroom a boy and a dog are sleeping in a bed. There is a glass jar on the floor in front of the bed. A frog is climbing out of the jar.

Picture 2: The boy is sitting on a branch in a tree, looking into a hole in the tree trunk.

Picture 3: An owl is flying out of the hole in the tree trunk. The boy has fallen to the ground under the tree. A swarm of bees is chasing the dog past the tree.

Picture 4: The boy is lifted in a deer's antlers.

References

- Alfieri L, Brooks PJ, Aldrich NJ, Tenenbaum HR. Does discovery-based instruction enhance learning? *Journal of Educational Psychology*. 2011; 103:1–18.10.1037/a0021017
- Beavers J, Levin B, Tham SW. The typology of motion expressions revisited. *Journal of Linguistics*. 2010; 46:331–377.
- Berman, RA.; Slobin, DI. *Relating events in narrative: A cross-linguistic developmental study*. Hillsdale, N.J.: Lawrence Erlbaum Associates; 1994.
- Bley-Vroman, R. The fundamental character of foreign language learning. In: Rutherford, W.; Sharwood-Smith, M., editors. *Grammar and second language teaching: a book of readings*. Newbury House/Harper & Row; New York: 1988. p. 19-30.
- Brown A, Gullberg M. Changes in encoding of path of motion after acquisition of a second language. *Cognitive Linguistics*. 2010; 21:263–286.
- Cadierno, T. Expressing motion events in a second language: A cognitive typological perspective. In: Achard, M.; Niemeier, S., editors. *Cognitive Linguistics, Second Language Acquisition, and Foreign Language Teaching*. Berlin: Mouton de Gruyter; 2004. p. 13-49.
- Cadierno, T. Learning to talk about motion in a foreign language. In: Robinson, P.; Ellis, NC., editors. *Handbook of cognitive linguistics and second language acquisition*. New York: Routledge; 2008. p. 239-275.
- Cadierno T, Ruiz L. Motion events in Spanish L2 acquisition. *Annual Review of Cognitive Linguistics*. 2006; 4:183–216.
- Choi SJ, Lantolf JP. The representation and embodiment of meaning in L2 communication: Motion events in speech and gesture in L2 Korean and L2 English speakers. *Studies in Second Language Acquisition*. 2008; 30:191–224.

- Ellis, N. The processes of second language acquisition. In: VanPatten, B.; Williams, J.; Rott, S.; Overstreet, M., editors. *Form-meaning connections in second language acquisition*. Mahwah, NJ: Lawrence Erlbaum; 2004. p. 49-76.
- Frost R, Siegelman N, Narkiss A, Afek L. What predicts successful literacy acquisition in a second language? *Psychological Science*. 2013; 24:1243–1252. [PubMed: 23698615]
- Gill, M.; Wegmann, B.; Mendez-Faith, T. *En contacto: Gramática en Acción*. Boston, MA: Heinle; 2006.
- Gleitman L. The structural sources of verb meanings. *Language Acquisition*. 1990; 1:3–55.
- Hohenstein JM. Language-related motion event similarities in English- and Spanish-speaking children. *Journal of Cognition and Development*. 2005; 6:403–425.
- Hohenstein JM, Eisenberg AR, Naigles LR. Is he floating across or crossing afloat? Cross-influence of L1 and L2 in Spanish–English bilingual adults. *Bilingualism: Language & Cognition*. 2006; 9:249–261.
- Hohenstein, J.; Naigles, L.; Eisenberg, A. Keeping verb acquisition in motion: A comparison of English and Spanish. In: Hall, D.; Waxman, S., editors. *Weaving a lexicon*. Cambridge, MA: MIT Press; 2004. p. 569-602.
- Inagaki S. Motion verbs with goal PPs in the L2 acquisition of English and Japanese. *Studies in Second Language Acquisition*. 2001; 23:153–170.
- Inagaki S. Japanese learners' acquisition of English manner-of-motion verbs with locational/directional PPs. *Second Language Research*. 2002; 18:3–27.
- Johnson JS, Newport EL. Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology*. 1989; 21:60–99. [PubMed: 2920538]
- Kellerman E, Van Hoof AM. Manual accents. *IRAL. International Review of Applied Linguistics in Language Teaching*. 2003; 41:251–269.
- Kersten AW, Meissner CA, Lechuga J, Schwartz BL, Albrechtsen JS, Iglesias A. English speakers attend more strongly than Spanish speakers to manner of motion when classifying novel objects and events. *Journal of Experimental Psychology: General*. 2010; 139:638–653.10.1037/a0020507 [PubMed: 20853990]
- Llanes À, Muñoz C. A short stay abroad: Does it make a difference? *System*. 2009; 37:353–365.10.1016/j.system.2009.03.001
- MacWhinney, B. *The CHILDES project: Tools for analyzing talk*. 3rd. Mahwah, NJ: Lawrence Erlbaum Associates; 2000.
- Maguire MJ, Hirsh-Pasek K, Golinkoff RM, Imai M, Haryu E, Vanegas S, Okada H, Pulverman R, Sanchez-Davis B. A developmental shift from similar to language-specific strategies in verb acquisition: A comparison of English, Spanish, and Japanese. *Cognition*. 2010; 114:299–319. [PubMed: 19897183]
- Mayer, M. *Frog, where are you?*. New York: Puffin Books; 1969.
- Montrul S. Agentive verbs of manner of motion in Spanish and English as second languages. *Studies in Second Language Acquisition*. 2001; 23:171–206.
- Naigles LR, Eisenberg AR, Kako E, Hightner M, McGraw N. Speaking of motion: verb use in English and Spanish. *Language and Cognitive Processes*. 1998; 13:521–549.
- Naigles LR, Terrazas P. Motion-verb generalizations in English and Spanish: Influences of language and syntax. *Psychological Science*. 1998; 9(5):363–369.
- Navarro, S.; Nicoladis, E. Describing motion events in adult L2 Spanish narratives. In: Eddington, D., editor. *Selected proceedings of the 6th Conference on the Acquisition of Spanish and Portuguese as First and Second Languages*. Somerville, MA: Cascadia Proceedings Project; 2005. p. 102-107.
- Negueruela E, Lantolf JP, Jordan SR, Gelabert J. The “private function” of gesture in second language speaking activity: A study of motion verbs and gesturing in English and Spanish. *International Journal of Applied Linguistics*. 2004; 14:113–147.
- Özçaliskan, S.; Slobin, D. Learning how to search for the frog: Expression of manner of motion in English, Spanish, and Turkish. In: Greenhill, A.; Littlefield, H.; Tano, C., editors. *Proceedings of*

- the 23rd Annual Boston University Conference on language Development. Somerville, MA: Cascadilla Press; 1999. p. 541-552.
- Özçaliskan, S.; Slobin, DI. Codability effects on the expression of manner of motion in Turkish and English. In: Özsoy, AS.; Akar, D.; Nakipos'lu-Demiralp, M.; Erguvanli-Taylan, E.; Aksu-Koç, A., editors. *Studies in Turkish linguistics*. Istanbul: Bos'aziçi University Press; 2003. p. 259-270.
- Papafraçou A, Hulbert J, Trueswell J. Does language guide event perception? Evidence from eye movements. *Cognition*. 2008; 108:155–184.10.1016/j.cognition.2008.02.007 [PubMed: 18395705]
- Papafraçou A, Selimis S. Event categorisation and language: A cross-linguistic study of motion. *Language and Cognitive Processes*. 2010; 25:224–260.10.1080/01690960903017000
- Saffran JR. Statistical language learning: Mechanisms and constraints. *Current Directions in Psychological Science*. 2003; 12:110–114.
- Saffran JR, Newport EL, Aslin RN, Tunick RA, Barrueco S. Incidental language learning: Listening (and learning) out of the corner of your ear. *Psychological Science*. 1997; 8:101–105.
- Sebastián, E.; Slobin, DI. Development of linguistic forms: Spanish. In: Berman, R.; Slobin, DI., editors. *Relating events in narrative: Crosslinguistic developmental study*. Hillsdale, NJ: Lawrence Erlbaum Associates; 1994a. p. 239-284.
- Sebastián E, Slobin DI. Más allá del aquí y el ahora: El desarrollo de los marcadores temporales en el discurso narrativo en español. *Substratum*. 1994b; 5:41–68.
- Shafto CL, Havasi C, Snedeker J. On the plasticity of semantic generalizations: Children and adults modify their verb lexicalization biases in response to changing input. *Developmental Psychology*. 2014; 50:794–808. [PubMed: 24001149]
- Slobin, DI. Two ways to travel: Verbs of motion in English and Spanish. In: Shibatani, M.; Thompson, SA., editors. *Grammatical constructions: Their form and meaning*. Oxford: Clarendon Press; 1996. p. 195-220.
- Slobin, DI. The many ways to search for a frog: Linguistic typology and the expression of motion events. In: Strömquist; Verhoeven, editors. *Relating events in narrative: Vol. 2. Typological and contextual perspectives*. Mahwah, NJ: Lawrence Erlbaum Associates; 2004a. p. 219-257.
- Slobin, DI. Relating narrative events in translation. In: Ravid, D.; Shyldkrot, HB., editors. *Perspectives on language and language-development: Essays in honor of Ruth A Berman*. Dordrecht: Kluwer; 2004b.
- Slobin, DI. What makes manner of motion salient?: Explorations in linguistic typology, discourse, and cognition. In: Hickmann, M.; Robert, S., editors. *Space in Languages: Linguistic systems and cognitive categories*. Amsterdam/Philadelphia: John Benjamins; 2005.
- Slobin, DI.; Hoiting, N. Proceedings of the Twentieth Annual Meeting of the Berkeley Linguistic Society. Berkeley: Berkeley Linguistics Society; 1994. Reference to movement in spoken and signed language: Typological considerations; p. 487-505.
- Stam G. Thinking for speaking about motion: L1 and L2 speech and gesture. *International Review of Applied Linguistics*. 2006; 44:143–169.
- Stillman, D.; Gordon, R. *Repaso: College edition: A complete review workbook for grammar, communication, and culture*. Chicago, Illinois: National Textbook Company; 1998.
- Talmy, L. Lexicalization patterns: Semantic structure in lexical forms. In: Shopen, T., editor. *Language typology and syntactic description*. Vol. 1. Cambridge, MA: Cambridge University press; 1985. p. 36-149.
- Talmy, L. *Toward a cognitive semantics: Concept structuring systems* Cambridge. MA.: MIT Press; 2000a.
- Talmy, L. *Toward a cognitive semantics: Typology and process in concept structuring*. Cambridge, MA: MIT Press; 2000b.
- Tarone E. On the variability of interlanguage systems. *Applied Linguistics*. 1983; 4:142–163.

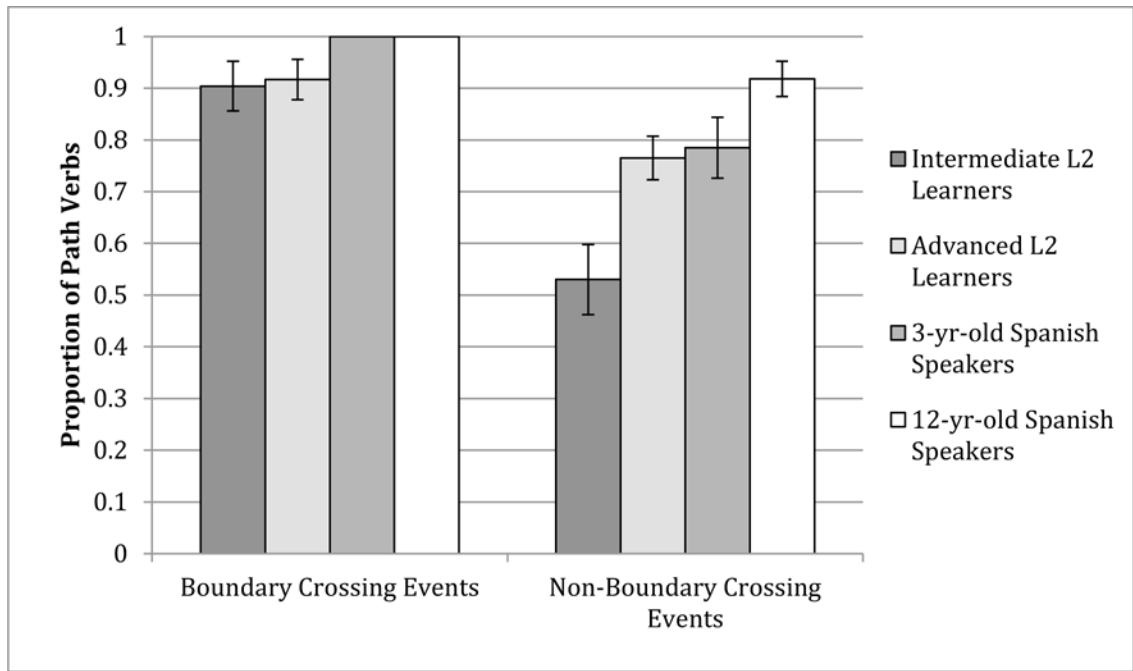


Figure 1.
 The proportion of path verbs produced for the two types of motion events by different groups. Boundary crossing events mandate the use of path verbs; non-boundary crossing events do not.

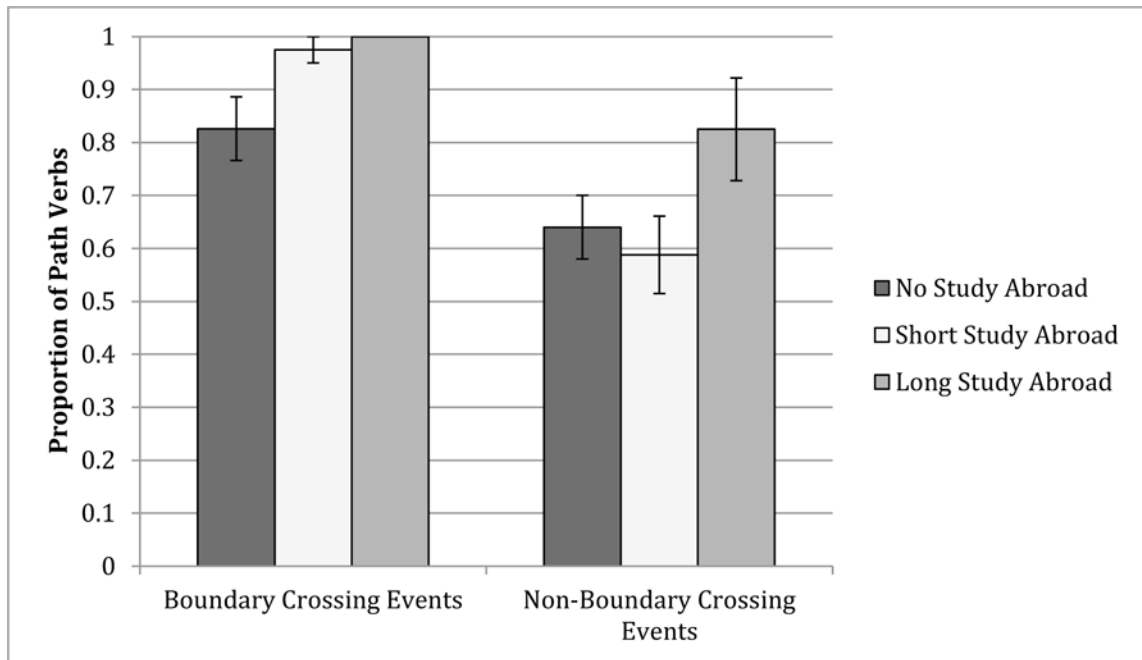


Figure 2.

The proportion of path verbs L2 learners produced for the two types of motion events by study abroad time, collapsing across both intermediate and advanced L2 learners. Boundary crossing events mandate the use of path verbs; non-boundary crossing events do not.

Table 1

Sample Responses Given by Native Speakers and L2 Learners

Group	Spanish Response with Path Verb	English Translation	Spanish Response with Manner Verb	English Translation
Native 3-Yr-Old	Aquí que se ha caído del árbol.	'Here he has fallen from the tree.'	—	—
Native 12-Yr-Old	Salió un búho y el chico se cayó .	'An owl exited and the boy fell .'	—	—
Intermediate L2 Learners	Fue una sorpresa cuando viene un búho del árbol.	'It was a surprise when an owl came out of the tree.'	Al mismo tiempo la rana esta saltando afuera de la jarra.	An attempt at saying: 'At the same time the frog is jumping out of the jar.'
Advanced L2 Learners	El búho le asusta y se cae .	'The owl scares him and he falls .'	De repente un búho vuela fuera el agujero...	An attempt at saying: 'Suddenly an owl flies out of the hole...'

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2

Types and Tokens of Motion Verbs Used by Intermediate and Advanced L2 Learners and 3- and 12-Year-Old Native Spanish Speakers to Describe Boundary Crossing Events and Non-Boundary Crossing Events in Four Frog Story Pictures

	<u>L2 Learners</u>		<u>Native Spanish Speakers</u>	
	Boundary Crossing Tokens	Non-Boundary Crossing Tokens	Boundary Crossing Tokens	Non-Boundary Crossing Tokens
Path Verbs				
<i>asomar</i> 'to peek out'	–	–	–	2
<i>bajar</i> 'to go down'	–	1	–	–
<i>caer</i> 'to fall' "caber" (mixed up similar words) "falls" (used English)	–	53 1 2	–	22
<i>coger</i> 'to catch'	–	–	–	1
<i>dejar</i> 'to leave (something)'	1	1	–	–
<i>escalar</i> 'to climb'	–	2	–	–
<i>escapar</i> 'to escape'	36	2	7	1
<i>huir</i> 'to flee'	2	6	–	–
<i>ir</i> 'to go' (main verb only included)	–	6	–	2
<i>levantar</i> 'to lift' "picks up" (used English)	–	3 1	–	1
<i>llevar</i> 'to take/carry'	–	–	–	1
<i>meter</i> 'to insert'	–	–	5	–
<i>pasar</i> 'to pass'	–	–	–	1
<i>perseguir</i> 'to chase' "conseguir" (mixed up similar words)	–	– 1	–	6
<i>poner</i> 'to put'	–	3	–	–
<i>quedar</i> 'to stay'	–	1	–	–
<i>sacar</i> 'to take out'	–	–	1	–
<i>salir</i> 'to exit/go out'	19	1	20	–

	<u>L2 Learners</u>		<u>Native Spanish Speakers</u>	
	Boundary Crossing Tokens	Non-Boundary Crossing Tokens	Boundary Crossing Tokens	Non-Boundary Crossing Tokens
<i>Seguir</i> 'to follow' "following" (used English)	–	1 1	–	–
<i>subir</i> 'to rise/go up'	–	12	–	16
<i>tirar</i> 'to knock down'	1	1	–	7
<i>tomar</i> 'take'	–	4	–	–
<i>traer</i> 'to bring'	–	1	–	–
<i>venir</i> 'to come'	6	1	–	1
"got stuck" (used English)	1	–	–	–
Manner Verbs				
<i>correr</i> 'to run' "cerra" (mixed up similar words)	–	40 1	–	11
<i>montar</i> 'to ride'	–	1	–	–
<i>saltar</i> 'to jump'	3	–	–	–
<i>volar</i> 'to fly' "avieron" (made- up word from <i>ave</i> 'bird' and/or <i>avión</i> 'airplane')	6 1	7	–	–

Table 3
 Mean Number of Path and Manner Verb Tokens Produced Per Person by the L2 Learners and Native Spanish Speakers

	N	Number of path verb tokens (SD)	Number of manner verb tokens (SD)	Proportion of path verbs (SD)	MLU (SD)
Intermediate L2 learners	26	2.62 (1.17)	1.19 (0.75)	.69 (.16)	11.10 (2.00)
Advanced L2 learners	24	4.46 (2.00)	1.08 (1.02)	.81 (.17)	12.34 (2.63)
3-year-old Spanish speakers	11	4.18 (1.66)	0.64 (0.51)	.84 (.16)	6.09 (0.71)
12-year-old Spanish speakers	10	4.90 (1.45)	0.40 (0.52)	.94 (.08)	11.51 (2.48)

Step 2 Sequential Regression Results of Class Level and Study Abroad Variables on Proportion of Path Verbs for separate analyses of Boundary Crossing and Non-Boundary Crossing Event Descriptions

Table 4

Boundary Crossing Events											
Step	R	R ²	R ² _{adj}	R ²	F _{chg}	df ₁	df ₂	p	B	SE B	β
1. Class	.030	.001	-.020	.001	.042	1	48	.838	.021	.060	.048
2. Abroad	.339	.115	.077	.114	6.041	1	47	.018	.104	.042	.338
Non-Boundary Crossing Events											
Step	R	R ²	R ² _{adj}	R ²	F _{chg}	df ₁	df ₂	p	B	SE B	β
1. Class	.392	.154	.136	.154	8.538	1	47	.005	.242	.081	.401
2. Abroad	.421	.177	.142	.024	1.326	1	46	.255	.066	.057	.154