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Verbs of Motion: Effects of Cross-linguistic Transfer in Spanish-English Bilingual Children

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**Verbs of Motion: Effects of Cross-linguistic Transfer in Spanish-English Bilingual
Children**

A thesis submitted in partial fulfillment of the requirement
For the degree of Bachelor in Arts in Interdisciplinary Studies with a concentration in
Linguistics from the College of William & Mary

by
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Abstract

Languages populate a typological spectrum between *verb-framed* and *satellite-framed* based on how they encode Path, the trajectory of a figure related to a fixed point, in motion events. *Verb-framed* languages encode Path on the main verb (e.g. *enter, exit, cross*). *Satellite-framed* languages tend to encode Path in a predicative satellite like a preposition, leaving the verb slot open for the optional element of Manner or how the figure moves (e.g. *walk, jump*). Bilingual speakers of one of each type, like of Spanish and English respectively, experience transfer between their two languages during acquisition. This study aims to integrate interaction between first languages and typological theory of verb frames in order to determine if bilingualism produces facilitatory effects in Path verb learning in Spanish-English bilingual children. Participants were 33 preschool and elementary school students ($M_{AGE} 5.02$) who were recruited based on their language status. Monolingual English speaking and Spanish-English bilingual children participated in a forced choice task and were scored on their ability to correctly identify novel verbs as Path or Manner. Results produced a significant main effect for the verb type conditions, and a significant interaction between language group conditions and verb type conditions. However, contrary to the hypothesis, bilinguals showed decelerated accuracy in the Path condition. More participants must be run, and more variations of this study must be conducted in order to determine the cause of these effects.

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1. Verbs of Motion: Effects of Cross-linguistic Transfer in Spanish-English Bilingual Children

Learning the verbs of one's own language may sound like a simple task; however, there is a host of ambiguities that come with any action that affects verb learning. A child enters the language speaking world, surrounded by actions and events that are performed, repeated and named. If a child sees their sibling jump from one room to the next and hears "hopping!" does the child automatically encode "hopping" as a jumping motion? Hopping could also mean entering the room or exiting the room adjacent. Would asking whether the child encodes the verb as specific to it being performed by their sibling be unreasonable; might "hopping" only occur in the child's home? Only over time and a variety of contexts can the child gain an accurate representation of what it means to hop. However, a speaker may be bilingual in languages that encode the event of hopping in syntactically different ways, which brings to light an interesting subject: how might this difference in lexical framing affect how bilingual children learn verbs in their first languages?

The primary interest of this study is to integrate three fields of language acquisition literature. Firstly, this paper will examine background on the typological tendencies of path and manner verbs and how path and manner as constructs differ across languages. These differences are critical to the selection of target languages studied here. Second, a review of verb acquisition in children will illustrate the way in which universal typology manifests in language-specific ways. This topic will include verb-type bias in adults and how, when, and why this bias emerges during acquisition. Finally, this paper will explore the burgeoning literature on bilingualism and how it affects general acquisition of a child's first languages through transfer, both negative and positive. Incorporating each of these three topics with one another serves the overall purpose of discovering what processes and schema bilingual children might use when managing verb

meanings in two typologically different languages. This circumstance may be a case where acquiring two languages of diverse typological backgrounds leads to an acceleration in acquisition of verb types compared with monolingual language learners.

1.1 Typology: Verb Frames Across Languages

Native English speakers might find the “what is hopping?” question rather intuitive; however, not all languages automatically attribute modality, in this case, the event of jumping up and down, onto most verbs as English does. This is due to a difference in verb framing. Languages behave differently when it comes to encoding types of event schema such as Path and Manner. Path describes the trajectory of an agent (e.g. *enter, exit, cross*), while Manner represents the modality or the way in which the agent moves (e.g. *run, jump, skip*) (Papafragou & Selimis 2009).

In his book *Toward a Cognitive Semantics*, Talmy (2003) describes two types of semantic framing that languages across the world exhibit: *verb-framed* languages and *satellite-framed* languages. *Verb-framed* languages, also referred to as *V-languages*, include those that encode Path onto the main verb. Languages that have this frame include Romance varieties, Japanese, and Semitic. Other semantic properties such as Manner are encoded on surrounding satellites such as prepositional or adverbial phrases (Pedersen 2019; Schröder 2016; Talmy 2003). French is among these languages.

1) Il est entré dans la maison en courant.

‘He entered in the house by running.’

In French, the Path schema of the sentence ‘enter’ is encoded in the main verb, while the Manner ‘running’ is encoded onto a prepositional satellite (Slobin 2004).

Satellite-framed languages, or *S-languages*, show the opposite pattern. In these frames, Path is encoded onto non-verbal satellites in the sentence, while Manner may be encoded onto the main verb. English, Chinese, and some Indo-European languages have a *satellite-framed* structure (Schröder 2016; Slobin 2004; Talmy 2003).

2) Chinese

tā zǒu chū le guānhǎilóu.

3sg walk exit pfv sea-viewing tower

‘He walked out of the sea-viewing tower.’

3) English

She is running out of the house.

3sg be run out of the house

As with any grammatical structure, whether a language is *verb-framed* or *satellite-framed* is subject to change over time as the language evolves. Chinese is an interesting case where throughout the centuries, it has evolved from a *verb-framed* language to a *satellite-framed* language. Like English, Modern Chinese encodes Path onto non-verb satellites (Hohenstein et al. 2006; Shi & Yicheng 2014).

Typological literature maintains the consensus that when a motion event is expressed in a language, directional features are considered the “core” lexical element (Talmy 2003; Johnson 1987). The most elegant explanations involve at least these elements: Path and Ground (a point of orientation for the figure). These are the smallest number of elements required to have a truly informative Motion sentence (example 4) (Talmy 1991, Brown & Gullberg 2010, Nakazawa 2007).

4) His sister entered the room.

(Figure) (Path) (Ground)

Manner, however, is optional in Motion events. Manner can be added as a predicative satellite (example 5), or Manner can be expressed in the main verb, while Path is maintained in a predicative satellite, depending on the typological constraints of the language (example 6).

5) His sister entered the room hopping.

(Figure) (Path) (Ground) (Manner)

6) His sister hopped into the room

(Figure) (Manner) (Path) (Ground)

Since Path schema are considered the core of the sentence event, typologists observe that Manner verbs show a great deal of diversity and nuance in *S-languages* (Slobin 2004, Cifuentes-Férez 2008). Slobin proposes that Manner verbs occur in one of two levels of lexical specificity: basic and non-basic. Basic verbs include those that express the most general sense of the action (e.g. *walk, run, jump*), whereas non-basic verbs are the variations of a basic verb (e.g. *dash, jog, sprint* are all second level verbs under *run*). *V-languages* tend to have a less diverse inventory of second-level manner verbs (Slobin 2004). Cross-linguistically, Path verbs show little variation in the number of types of Path, which may be due to the finite number of possible paths in which a figure can move. For example, Spanish and English share 13 Path types, including ‘away from,’ ‘up/onto,’ and ‘to/towards;’ however, Spanish tends to show more lexical variation within the inventory of these types than English (Cifuentes-Férez 2008; Selimis & Katis 2010). Corpus studies have estimated English to contain about 20-44 Path verbs while Spanish has upwards of 63 (Cifuentes-Férez 2008; Talmy 2003).

Interestingly, speakers are quite sensitive to the verb-framing typology of their languages, even if it is unconsciously. Depending on whether one speaks a *V-language* or an *S-language*,

speakers are statistically shown to encode motion events differently (Ferez 2007; Maguire et al. 2010). In a cross-linguistic study, Slobin (2006) found that when presenting an image of an owl flying out of a tree, *S-language* speakers were much more likely to map Manner onto the main verb of the sentence while describing Path in a satellite. Unsurprisingly, *V-language* speakers mapped Path onto the main verb, and some did not express Manner at all. The pattern seemed to follow that for the latter typology, Manner was not mapped unless it was emphasized in the image. When a boundary is being crossed, such as the owl moving *away* from the tree, Path is almost exclusively expressed in the main verb (Slobin 2006). In studies such as these where Path is a crucial element of the sentence, *V-languages* tend to show a high frequency of path verbs produced, while in *S-languages*, use of Path verbs was boosted but Manner was still produced more often than in the *V-language* groups (Naigles et al. 1998; Papafragou et al. 2002). In previous studies, results suggest that when shown a verb that is ambiguously Path or Manner, English speakers are more likely to map the verb onto manner (Naigles et al. 1998; Garnsey, Lotocky, Pearlmutter, & Myers 1997). These typological predispositions will be key for examining how Spanish and English affect one another in the language acquisition periods of a bilingual child.

1.2 Verb Type Bias and Language Acquisition

1.2.1 Core Schema and Verb Inventory. To focus the exploration of these topics, this section serves to summarize and discuss the typological differences between the target languages of this study, Spanish and English, and the resulting effects on acquisition in children. Maguire et al. (2010) adds some valuable nuance to Talmy and Slobin's models for *verb-framed* languages and *satellite-framed languages*. They state that rather than a set of black-and-white categories, typologists would be better off treating *V* vs *S* as a continuum, where *S-languages* use primarily

Manner verbs regardless of context, and where *S-languages* use Manner and Path verbs in proportionate distribution with the “crossing boundaries” context (Feist 2016; Maguire et al. 2010; Slobin 2006). For English speakers, using a Path verb to describe an event may seem strange and uninformative; however, existing so far on the *S* end of the continuum is actually rather unusual. Across languages, Path has been labelled the *core schema* for the majority of utterances, an indispensable frame, while Manner is optional (Jackendoff 1996; Talmy 2003).

Multiple studies have been conducted that investigate extensive corpora in order to determine the distribution of Path and Manner verbs across languages. Slobin (2006) reports English as an *S-language* as having several hundred verbs to describe Manner and Spanish as a *V-language* having less than 100. In addition to this work, others have conducted image description task studies to allow speakers an open-ended opportunity to encode a motion event with a Path or Manner verb. Naigles and Terrazas (1998) conducted a study with native Spanish speakers and native English speakers to observe the potential effects of verb type bias. Participants watched a series of videotaped motion events, each of which involving both a distinct manner and path (e.g. a woman *skipping* and moving *toward a tree*). The verb was given a novel name (e.g. *Look! She's kradding!*). The participants were then shown two test videos, one that demonstrated the correct path and one that demonstrated the correct manner, and instructed to indicate which of the two represented the sample video. The results showed that English speakers were significantly more likely to choose the Manner response than the Path, while Spanish speakers were equally likely to select the Manner response as they were the Path. Studies like these clearly demonstrate how typology can result in a verb type bias when encoding events (Garnsey, Lotocky, Pearlmuter, & Myers 1997; Naigles & Terrazas 1998).

1.2.2. Path and Manner acquisition and language-specific bias in children. Compared to most nouns in a language, verbs are extremely difficult for a child to learn. Even before the child is producing meaningful utterances, they are shown to have concepts for objects and their boundaries and limitations, including tracking moving objects in relation to stationary ones, reflecting the core schema of Path-Motion (Baillargeon 1987; Bertenthal, Gredebäck, & Boyer, 2013; Bower, Broughton, & Moore, 1971; Pulverman 2005). By their first year, children are able to map words reliably onto objects, usually accompanied by gesturing; however, naming is not accompanied by any syntactic structure until about 2.5 years of age (Cartmill, Hunsicker, & Goldin-Meadow 2014; Gleitman et al. 2005; Holowka, Brosseau-Lapr e, & Petitto 2002). Mastery of verbs is acquired much later, and a lack of mature cognition when it comes to the relationships between objects is one of the theories that attempt to explain this delay (Behrend 1990; Hirsh-Pasek & Golinkoff 2010). A verb is a relatively abstract concept that does not map onto a concrete object, but rather the temporal relationship an object has with its environment.

With any verb, the child observes the phenomenon over time in a variety of contexts and begins to build categories that appropriately capture its meaning (Forbes & Farrar 1993; Mareschal & Quinn 2001). The categories of interest for this study include when children reliably categorize Path and Manner verbs and what language-specific influences affect those categories during acquisition. Pulverman et al. (2008) demonstrated that children even as young as 9 months were able to detect changes in Manner and Path. They conducted a visual fixation paradigm task where the child was presented with scenes that changed in Manner, Path, both Manner and Path, or neither. Both English-exposed and Spanish-exposed infants were included, and both groups showed this same sensitivity. Though this sensitivity exists, the child does not yet have the syntactic structure to make hypotheses about prepositional or adverbial satellites

that could help distinguish Path from Manner within a sentence. The child has years to go before grasping how the typology of their language affects the syntax; therefore they rely on bottom-up cues that link verbs with a variety of situations. Luckily, infants are also proficient at forming categories with very little input, so “running” can mean “running in a field” as well as “running across a bridge,” etc. (Konishi et al. 2016).

The literature describes children beginning to show language-specific bias for this typology between 3 and 7 years of age (Allen et al. 2007; Skordos & Papafragou 2014). Studies have shown that children overall encode motion events that demonstrate both Path and Manner as a Path verb more often than they encode it as Manner when compared with adults across languages (Papafragou & Selimis 2009). These results suggest that bias toward Manner interpretations is learned and language-specific.

1.3 Interactional Theory Between First Languages

In the literature there have been long-standing theories for cognitive representation of a bilingual speaker’s native languages (Tavakol & Jabbari 2016). They encompass a broad range of the level of connectedness between the two languages. Some models suggest that the languages begin as one language system that gradually diverges into two distinct languages over time, which are coined the *Unitary Language System* or the *Unitary System Model* (Bhatia & Ritchie 1999; Genesee 1989). On the other end of the spectrum, researchers suggest a *Dual Systems* model which proposes that the speaker’s first languages begin separated and remain separated, and the domains of each language do not interact at all during acquisition (Keshavarz & Ingram 2002). However, studies support a middle ground theory of interaction (Deuchar 2016; Hossein & Ingram 2002; Schwartz & Sprouse 1996). Paradis & Genesee (1996) proposed that

during acquisition, languages of the bilingual child may be interdependent in three ways: transfer, acceleration, and deceleration.

1.3.1 Interaction. When a child is raised speaking more than one language, the domains of each acquired language are not mutually exclusive. In fact, in some cases, aspects of one of the child's languages can affect the acquisition of that same quality in the child's other language. This idea of *interaction* involves the ways in which a child's first languages are independently developed and the ways in which that interdependence affects rates of acquisition of certain domains of language compared to a monolingual (Paradis & Genesee, 1996).

1.3.2 Transfer. Transfer refers to the language-specific features found in productions of the other language that cross-linguistically affect one another (Fabiano-Smith & Goldstein 2010; Paradis, 2001; Müller & Mueller 2017; Whong-Barr & Schwartz 2002). These effects are referred to as *acceleration* and *deceleration*, and describe opposite phenomena that can be observed in experimental data. When cross-linguistic interaction occurs in such a way that facilitates quicker acquisition of a domain of language, the literature refers to the effect as *positive transfer*. When delays in certain aspects of acquisition are observed, this is called *negative transfer* (Müller & Mueller 2017) .

1.3.3 Acceleration. Bilinguals show *acceleration* when their rate of acquisition in certain domains is earlier or faster when compared to monolinguals (Fabiano, 2006). Specifically, this earlier mastery in a domain of one of the bilingual's languages is caused by the acquisition of that domain in the other language (Müller & Mueller 2017). Phonology has been a popular domain within which researchers have studied the effects of transfer in children. Recent studies have shown that, in bilingual children, certain steps for acquiring their inventory of sounds can occur at slightly different rates, and in some cases, bilinguals show an advantage (Keffala et al. 2018).

One can observe these specifically phonological differences within a window of development between about 2 and 4 years old (Keffala et al. 2018; Prezas 2004). A typically developing monolingual 2-year-old is still in the process of developing consonant forms like clusters, velars, fricatives, etc (Dodd & McIntosh, 2006). The literature on transfer in Spanish-English bilingual children has mainly focused on consonant form production. Specifically, when elicited to perform the target sounds, Spanish-English bilingual children within this age bracket performed better than Spanish monolingual children. The general conclusion to these findings is based on data from the SUBTLEX corpora. According to this database, the target consonant forms of these studies are much more frequent and in greater complexity in English than in Spanish. Therefore, the conclusion of the study finding is that exposure to the frequency and complexity to these consonant forms in English is facilitating performance of consonant forms in Spanish for bilingual children. That is, Spanish-English bilingual children from 2-4 years old are performing consonant forms better in Spanish, than Spanish monolingual children are (Keffala et al. 2018; Lapata, Keller, & Walde 2001). There is a possibility that these effects might be seen in verb type acquisition for the appropriate age group, which will be explored in the current study.

1.3.4 Delay or deceleration. Acquisition delay or deceleration refers to the later or slower rate of acquisition in bilinguals as compared to monolinguals due to cross-linguistic effects from one language to the other (Vihman & McLaughlin, 1982; Gildersleeve, Davis, & Stubbe, 1996; Müller & Mueller 2017). The literature suggests that deceleration occurs simply from the cognitive load of being bilingual. Children who are bilingual have been shown to exhibit delays in vocabulary mastery compared to their monolingual peers, and even bilingual adults show slightly slower retrieval time in lexical tasks. Lexical delay adds to a greater body of misinformed diagnoses of language and speech disorders in bilingual children. This deceleration

is often not disordered, but rather, a result of the natural cognitive cost of maintaining two language systems at once and actively selecting the appropriate language for the situation. This delay has been described in the literature as being attributed to a trade-off advantage in executive functioning (Bialystok 2001).

1.3.5. Other cognitive factors. The fact that bilingual children demonstrate an advantage in executive functioning makes logical sense. The bilingual child must make very active decisions about which language will be appropriate to which people, a task monolinguals may never worry about. Rather than two language systems existing in the mind that one turns on or off depending on the situation, research has found that actually both grammars remain active at all times. This process is cognitively taxing; therefore, the speaker relies on executive functioning to inhibit the language that is not appropriate for the situation, which costs processing time (Carlson & Meltzoff 2008). Guttentag et al. (1984) conducted an experiment that tested the lexical response time for bilingual speakers of English (a *satellite-framed* language) and French (a *verb-framed* language like Spanish.) Target words that represented one of four possible semantic categories were assigned a particular response from the participant, while flanker words in the other language from other semantic categories served as distractions. Results indicated that bilingual speakers had higher response times, suggesting that bilingual speakers showed a delay in lexical decision due to the cognitive load of irrelevant language suppression (see also Malt et al. 2016).

This delay is also found in children during the stages of acquisition; however, they show higher scores in tasks that involve higher executive functioning. Bialystok (1986) studied cognitive control in a grammatical judgement task. Children were asked to assess the grammaticality of a puppet who had bumped his head and was “saying things in silly ways.” In

the conditions that required the greatest amount of executive control, sentences that were grammatical but not meaningful (e.g. *Apples grow on noses!*), bilingual children showed the highest accuracy.

1.4 Current study

The scope of this study will focus mainly on the possibly acceleratory effect of bilingualism on verb learning. Positive transfer effects have been shown to occur in Spanish-English bilingual production of certain phonological features. Performance of both monolingual English and bilingual Spanish-English speakers on a subtle but non-ambiguous verb identification task will be measured. An additional topic of interest is how these metrics will change based on differences between speakers in language input, output and dominance.

The specific goal of this study is not only to elicit this new data, but also to reorganize the elicitation tasks in order to collect quality data with efficiency, based on personal experience and success with those tasks in previous research. The broad goal of this research is to add to the collection of empirical data that provides evidence to differences in acquisition rates of bilingual and monolingual speakers. Unfortunately, some bilingual children are misidentified as having language disorders, when in reality, they may be experiencing a relatively brief delay due to a language difference that will develop fully by the end of the acquisition period (Goldstein 2001). Adding to general knowledge about language differences in bilingual children will aid in dispelling implicit biases in clinical treatment.

The study contains two conditions that are presented across two language groups. Video clips, much like the ones in the Naigles and Terrazas (1998) study, were shown to English monolingual children and Spanish-English bilingual children. However, aside from the difference in language groups, this experiment implemented one crucial manipulation. Rather

than the sample clips demonstrating motion events that can be interpreted as Manner *or* Path, the samples will provide novel verbs that can be correctly interpreted as only Manner or only Path. The samples will also appear in triads of different examples, showing a certain, but not entirely obvious verb type. The child will be instructed to choose from two samples which is most like the verb demonstrated in the sample videos. One answer will be based on verb-tracking patterns, and one answer will be based on tracking lower level similarities in the videos. The main hypothesis of this study states that Spanish-English bilingual children will perform with higher accuracy in the Path condition than their English monolingual counterparts. If this holds true, it suggests that there is in fact positive transfer occurring to path verbs in English due to exposure of bilinguals to more instances of path verbs in Spanish. If this hypothesis is incorrect, then it is reasonable to conclude that positive transfer is not occurring in this domain.

Generally, this research seeks to show how two languages may affect each other in the specific domain of path and manner verb learning in children. These effects, whether they be accelerations or delays, are typical stages for bilingual speakers. For this population, neither language facilitates or inhibits acquisition more than the other in a manner that is detrimental to the speaker.

2. Method

2.1 Participants

33 preschool and elementary age children (Range(4;0-7;10), M_{AGE} 5.02) participated in the following study. All were recruited from the greater Williamsburg area and James City County. Participants were only run if they gave verbal assent and the researchers had received a completed consent form from the parent or legal guardian. Consent forms included a language

background survey on which caretakers reported the child's exposure to Spanish and English. Children who were reported to have significant exposure to Spanish (i.e. in their home/more than just Spanish class) and proficiency in Spanish and English were considered bilingual. Of the 33 participants, 20 were monolingual English speakers, 12 were Spanish-English bilingual speakers, and 1 had some other combination of language exposure. One participant was excluded for not completing more than 4 of the 8 trials, and one participant was excluded for a lack of proficiency in English. Of the 31 participants who were included in the study, both groups of bilingual and monolingual children were randomly assigned to one of two orders of the same task. All participants were given all of the same trials unless the child elected to stop before the session was over.

2.2 Procedure

Each of the participants were shown the same series of short videos, consisting of 8 trials. Two orders of trials were randomly assigned to participants. Order 1 contains a pseudo-randomization of all combinations of variables so that they each occur twice, once on the right and once on the left. Order 2 is Order 1 reversed. The videos were played on a laptop placed directly in front of the child so that they may point and indicate their answers on the screen. Appendix A contains the procedure script for the researcher. All participants were given the option to stop the activity at any time. All participants were run either in the William & Mary Child Language Lab or in a relatively quiet room in their school.

2.3 Variables

The current study features a 2x2x2 design. Two levels are related to the main hypothesis: LANGUAGE GROUP (bilingual v monolingual) and VERB TYPE (path v manner). Additionally a counterbalance variable of ENVIRONMENT (scene v person) was integrated into the design

(Appendix B). Each of the trials consists of 3 sample videos each of which all demonstrate either a path or a manner verb. The 8 verbs are all intransitive actions which are referred to by a nonce word.

E.g. *Look she's rizzing! She's rizzing again. She's rizzing here too.*

After the three sample videos have played, the child is shown two test videos simultaneously and side-by-side on the screen. They are then prompted to indicate which of the test clips is an example of the verb demonstrated in the samples.

E.g. *Which one is rizzing? Can you find rizzing?*

2.3.1. *VERB TYPE (path vs manner)*. Of the 8 trials, 4 of the sets of videos demonstrate and test a Path verb and 4 demonstrate and test a Manner verb. The videos aim to portray each verb in an unambiguous yet not entirely obvious way.

In the Path trials a non-transitive, trajectory-based action is performed in a variety of Manners. For example in the verb *rizzing*, the subject performs the action of exiting a box three times. She leaves the box by stepping out to the left, then by crawling out to the right, then by falling forward out of the box. In the test phase one of the two videos show a person hopping out of the box, and the other video shows a person hopping into the box. The test phase demonstrates the two subjects performing an action that has Manner in common (hopping); however, the subject hopping *out* of the box is performing the correct verb as opposed to the subject hopping *into* the box (Figure 1).



Figure 1. An entire trial for *rizzing*, a Path verb. Person A moves in a variety of Manners in relation to the Ground (a box) while maintaining the same Path (out of). The test phase demonstrates Person B performing the correct Path and Person A performing the incorrect Path.

Likewise, in the Manner trials the subject(s) performs a non-transitive, modality-based action in a variety of Paths. The verb *tilking* involves the subject demonstrating three instances of running. She first runs toward a parked car, then along the side of the parked car, then around the parked car. The test phase shows two examples of the same Path of past the front of the parked car, but one of them demonstrates the correct manner of running while the other demonstrates the incorrect Manner of walking.

2.3.2. *ENVIRONMENT (person vs scene)*. In order for the participants to consistently select the correct test item for the path or manner verbs, we expect them to be able to track patterns across a variety of contexts. If path *vs* manner is the only pattern they are required to track, this does not inform us about whether verb-type is what they are tracking or if they are simply following low level similarities. Therefore, a separate counterbalance must be implemented to provide a pattern that is equally likely to be encoded but is not verb-based. In addition to Path *vs*

Manner, a person *vs* scene counterbalance was implemented. The person and scene variations were combined evenly between the path and manner variations so that all combinations of path-person, manner-person, path-scene, and manner-scene were shown twice each.

In the trials with the person variations, a single actor (Person A) would perform all three of the sample videos, such as moving in relation to a ladder. In the test phase, the actor from the sample set would perform the incorrect action, while an unfamiliar actor (Person B) performed the correct action around the same ladder (Figure 2). Some actors appeared in more than one trial; however, as a precaution, actors that were filmed as Person B in any trial were not filmed as Person A in another trial.

In the trials with the scene variations, only one actor is used for the sample videos and both test videos. For the sample videos, the actor performs the action in a particular scene, such as moving in relation to the entrance of a garage. In the test phase, the actor performs the incorrect action in the familiar scene and performs the correct action in a novel scene, such as in relation to the front door of a house (Figure 2). Across all trials no scenes were reused.

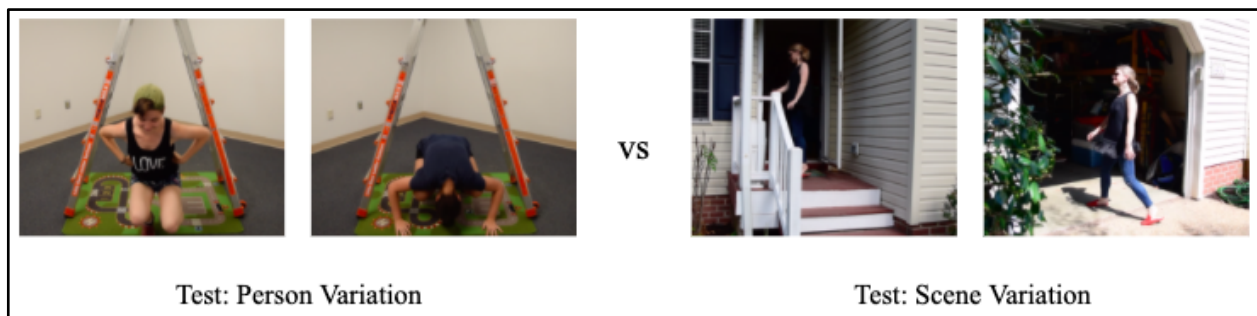


Figure 2. The left pair is an image from a test scene on a Manner/Person trial. The right pair is an image from a test scene on a Path/Scene trial.

The Person/Scene counterbalance is designed to ensure that the participant is truly making a decision based on their knowledge of verb types, and not relying on patterns of similarity that involve irrelevant details. By including Person and Scene in addition to the

Manner and Path variable, the design ensures that irrelevant non-verb similarities are just as likely to be informative as verb-related patterns. If the participants are paying attention to word type and filtering out irrelevant information, they should be able to correctly distinguish Manner and Path verbs. If they do not discriminate in this way, the participants' scores will show chance-level accuracy.

2.4 Coding

The stimuli were shown on a laptop placed so that the participants might indicate by pointing to the screen, which test video was the correct answer. If the child's answer was unclear, they were asked to indicate their answer once more. Responses were discreetly recorded by the researcher as the child gave them. Responses were recorded as either R or L, which stands for whether or not the child chose the clip on the right or the left side of the screen. These were then coded later on out of the child's presence as to whether the response was correct or incorrect.

Participants received both a path and a manner score, both conditions having a ceiling score of 4/4. Person and scene scores were also recorded, each out of 4 points, in order to analyze possible interaction between path/manner and person/scene.

All data from all participants were analyzed unless they failed to answer more than four trials, or they were not proficient in English. Two participants were excluded, one for each of these reasons.

2.5 Hypotheses and Predictions

Based on the literature it is reasonable to predict that exposure to more frequent use of path verbs in Spanish could facilitate the bilingual child's ability to encode path onto verbs in

English. If this is true, bilingual subjects may show higher scores in the path condition than monolingual subjects show in the path condition. Furthermore, since both conditions of participants have sufficient experience with manner verb encoding, all participants are expected to demonstrate significantly high accuracy in the manner conditions.

As previous research has mostly focused on this kind of facilitatory interaction in the scope of phonological production, it is possible that the interaction between Spanish and English verb-types does not exist in this way. If this is the case, participants may use lower level pattern-seeking strategies to formulate a response rather than consistently follow based on verb-type. They would be expected to treat the person/scene variations as an equally valid pattern to track as path/manner. Manner scores may continue to be close to adult-like for both groups since both languages have sufficient exposure to encoding manner onto the verb; however, neither group would show accuracy in the path condition that was significantly over chance.

The literature also suggests that English speakers develop a manner bias over time. By the age of 7 years old, English speakers will almost exclusively encode manner onto verbs for verb-type-ambiguous scenes. If this fact affects the results, then younger monolingual English speaking participants may show higher scores in path than the older participants.

2.6 Design and Analysis

A 2x2x2 design was run in which two factors were manipulated within all subjects: VERB TYPE (manner v. path) and ENVIRONMENT (scene v. person). The participants were divided by LANGUAGE GROUP (bilingual v. monolingual).

A Generalized Linear Mixed Model analysis was performed to detect interactions between VERB TYPE and LANGUAGE GROUP. An analysis was also performed to detect interactions between VERB TYPE and ENVIRONMENT.

3. Results

In the analysis a generalized linear model was run with the dependent measure being *accuracy* in responses. LANGUAGE GROUP and VERB TYPE were analyzed as fixed effects while ENVIRONMENT was analyzed as a counterbalance effect. A generalized linear model was then conducted to search for significance, where the language condition remained in two categories, Bilingual and Monolingual, and the verb type conditions were split into Manner and Path between subjects. The goal of this analysis is to determine whether one's language condition has any effect on one's verb type identification accuracy. The analysis returned no significant differences in general score between monolinguals and bilinguals, [$X^2=1.159$, $p=.282$]. However, the model indicated a significant main effect of VERB TYPE condition, [$X^2=18.755$, $p<0.0001$], and a significant interaction effect between LANGUAGE GROUP and VERB TYPE condition, [$X^2=5.350$, $p=.021$].

In order to check the directionality of this interaction, two pairwise comparisons were run for each Bilingual/Monolingual and Path/Manner combination. In both language groups, participants have similar almost ceiling accuracy for Manner verbs. Both language groups show a decline in accuracy for Path verbs; however, bilingual participants seem to have even lower scores in the Path condition than monolinguals (Figure 3). This interaction is the opposite of what the hypotheses of this study predicted. Mean accuracy and p -values for each combination of conditions are summarized in Table 1.

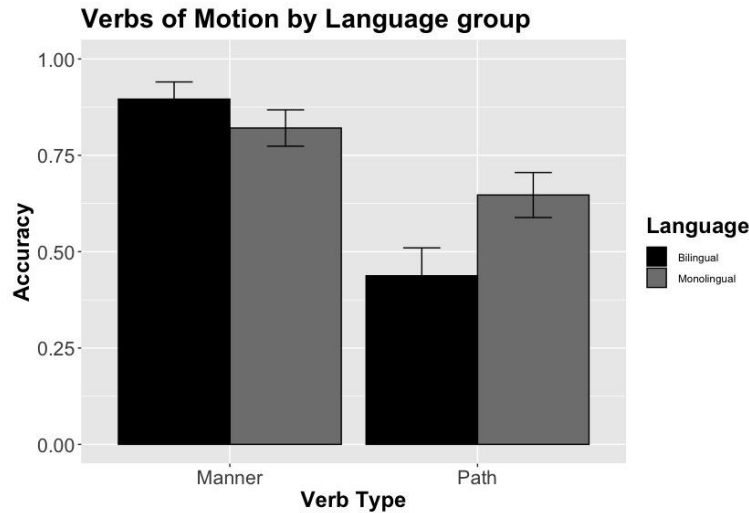


Figure 3. Graph of the mean total Manner and Path score by language condition. Overall, the language groups performed comparably. Both groups performed better in the Manner condition, and monolinguals scored higher than bilinguals in the Path conditions.

VERB TYPE	Probability accuracy	LANGUAGE GROUP	p-value
	Monolingual	Bilingual	
Manner	0.821 (SE=0.0468)	0.896 (SE=0.0441)	0.2694
Path	0.647 (SE=0.0580)	0.438 (SE=0.0716)	0.0264

Table 1. Pairwise comparisons of probability accuracy in responses across language groups. In Manner conditions, all participants are equally accurate. In Path conditions, Monolinguals show significantly higher accuracy than Bilinguals.

To analyze whether other effects were contributing to overall accuracy, a generalized linear model was conducted to compare the Scene variation to the Person variation, and to determine if there was any interaction between Path/Manner and Person/Scene across all language conditions. The model showed that there were significant main effects in the Person/Scene conditions overall, [$X^2=3.902, p=.048$], but no interaction between the verb type and environment conditions, [$X^2=.429, p=.512$] (Figure 4).

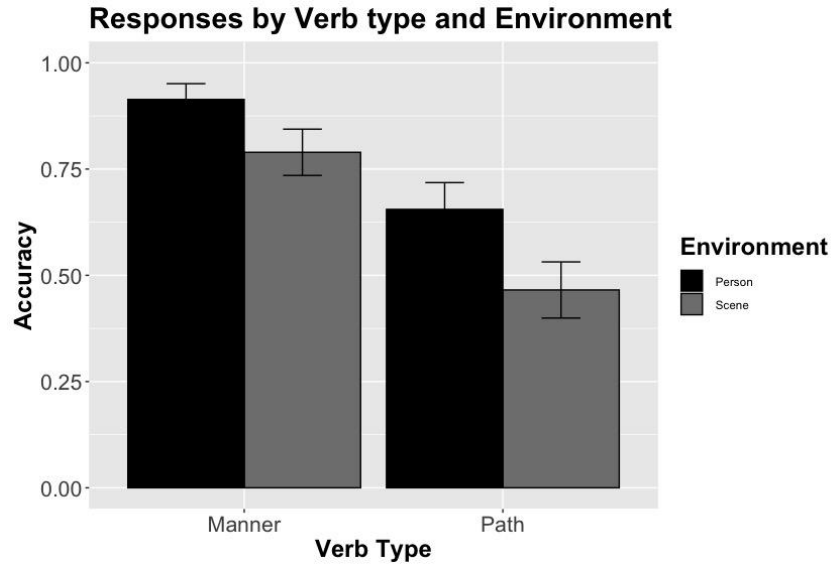


Figure 4. Graph of the mean total Manner and Path score by environment condition. In addition to already observed effects between language conditions, participants overall had greater accuracy in the Person conditions than in the Scene conditions.

Additionally, an analysis was performed based on age. All participants were sorted into four different age bins. An additional generalized linear model was run to determine if there were any main effects between age groups across the Path and Manner conditions, and if there was any interaction between age bin and VERB TYPE condition. The model returned that there were no significant main effects across age bins, [$X^2=5.233$, $p=.156$]. There was a marginally significant interaction between age bins and VERB TYPE condition, [$X^2=6.494$, $p=.090$] (Figure 4).

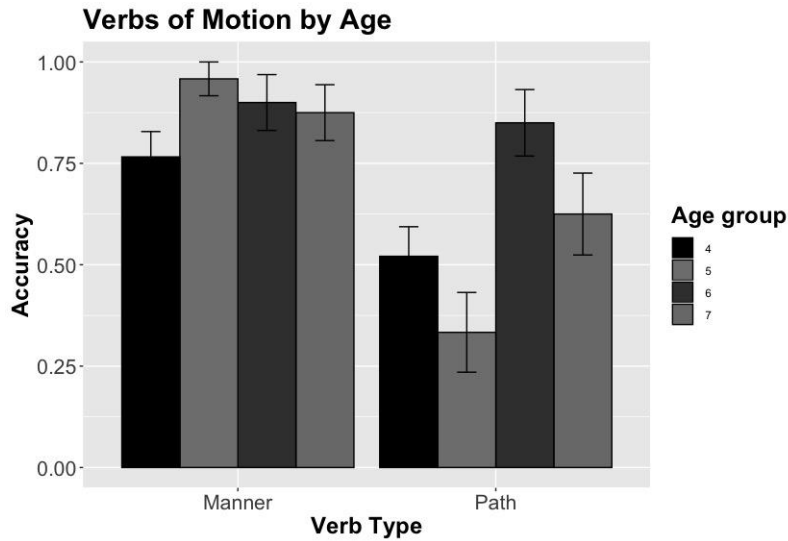


Figure 5. Graph of the mean total Manner and Path score by age group (in years). In addition to already observed effects between language conditions, no one age group performed significantly better than the others, showing that there were no improvement effects as the participants became older.

4. Discussion

The current study was designed to explore the possible relationship between the typological differences between *verb-framed languages* and *satellite-framed languages* and bilingual interaction during language acquisition. Spanish and English were chosen to represent *V-languages* and *S-languages*, respectively. The study included a design that effectively tested children's mastery of path and manner verbs, and its main interest was to examine the interaction between being bilingual and one's mastery of manner and path verbs specifically. Counterbalanced variables, Person and Scene, were implemented to provide a distractor pattern that was just as likely to describe the event should the participant fail to maintain verb-related schema to complete the task. To summarize, the study tested whether or not one's language condition (bilingual/monolingual) affected their ability to recognize path and manner in novel verbs where other patterns, such as person or scene, were equally probable.

The rationale behind this study is to add to the body of work attesting to the unique acquisition experience of bilingual children. Often, bilingual children are incorrectly identified as having speech and language disorders or delays, when in reality certain steps of acquisition happen at a different rate for bilingual children. Despite minimal delays in lexical retrieval, there is nothing harmful to the child's language ability if they learn more than one language from birth; in fact, the skill will serve them in the future. Ideally, the more information there is about the experience of bilingual speakers, the less bilingualism will be stigmatized by educators and the public.

The hypothesis of this study was as such: due to exposure to a *verb-framed* language where path verbs are much more frequent, being Spanish-English bilingual may produce a positive transfer effect that boosts accuracy in identification of novel path verbs in English. The results revealed that no such facilitatory transfer occurred in bilinguals, and in fact, there was a slight deficit in accuracy for identifying novel path verbs. It appears that cross-linguistic transfer does not aid in verb learning in this way.

There are a variety of reasons for Spanish-English bilinguals not performing in accordance with the hypotheses of this study. The first few and least interesting reasons stem from possible methodological issues. For instance, bilingual preschoolers and elementary schoolers were a challenge to access in the area in which this study was conducted. Only 12 Spanish-English bilingual children were tested as opposed to the 22 monolingual children that were run. It is possible that this number of participants one language condition does not contain the statistical power to provide a result that is accurate to the population. Likewise, the study may have lacked the overall number of participants required for appropriate statistical power. Another reason may be participant discomfort. Being pulled from classrooms or taken out of

one's routine can be jarring for a child. While the experimenters maintained a friendly and encouraging attitude, and assured each child that they could stop at any time, it is possible that participants of our small bilingual sample were intimidated by the interruption from people they did not know to enter an unexpected testing situation. Alterations to the procedure to these ends will be discussed in the "future directions" section.

Additionally, one may interpret these results from a cognitive lexical retrieval perspective, which taps into deeper, more exciting typological questions. As discussed in the literature, bilinguals show delay in tasks where they are asked to retrieve word meanings. There is a cognitive cost when retrieving the meanings of words when the speaker has twice the vocabulary stored in their lexicon. Research has shown that the speaker does not turn one language on and shut the other off when speaking to someone, but rather the entire lexicon is activated at once, and the speaker must actively suppress vocabulary from the irrelevant language. Perhaps when performing the task, the bilingual participants felt a time constraint pressure that restricted the time necessary to properly suppress distractor variables in English. This explanation is unlikely, however, because the bilingual participants performed on par with monolingual English speakers in the Manner condition. Another possibility for why bilinguals did not exhibit superior performance in the Path conditions despite the hypothesis of positive cross-linguistic transfer, is that bilingual children may include Manner bias in their code-switching, suppressing Path forms with the rest of their Spanish language. If 4-8 year-old bilinguals have a sense of the limited Path verb inventory in English, it is possible that they may not try to extend their knowledge of Path from Spanish onto motion events in English. Additionally, English speakers tend to learn a large proportion of transitive verbs and Manner verbs before they learn many Path verbs, apart from very simple ones like 'go' and 'come' (Pye

et al. 1995). Perhaps bilingual children of this age do not have the inventory of Path verbs to make assumptions about Path from a motion event.

The fact that the scene vs person variation produced significant differences in both groups also brings up an interesting question. Why was the change in scene seemingly more distracting than a change in person across conditions? Research shows that children rely heavily on context and related objects to track patterns of words. Children have been seen to learn nonsense verbs with greatest accuracy when not only the agent of the verb was consistent, but also the scene in which the event happened (Schwartz, Kleeck, Maguire & Abdi 2017). Young children are also known to perform better in vocabulary tests when taught the meanings of words in a continuous context. Chilton & Ehri (2015) conducted a study in which third graders were given a list of new vocabulary words to memorize. One group received the words in sentences that were not related to one another, and the other group received the words in sentences that followed a continuous context. Results showed that the group with the cohesive context scored higher on post-task memory tests. Context and environment is extremely important for verb acquisition. It follows that the items in the current study that differed in Scene in the test phase resulted in lower accuracy. Suppressing the urge to pay attention to the environment in which the verb occurs may be more difficult than ignoring the person performing it.

Finally, researchers have conducted much research in the domain of *self-action* vs *observed-action*. Adults understand that an action with a human/animal agent involves a goal based on desires or beliefs of that agent. At an early age, children have not fully developed the theory of mind to understand the parallels and differences between another person performing an action and their performance of the action with their own bodies (Huttenlocher et al. 1983). The difference between the Person/Scene conditions in the present study may be due to the fact that

universally and cognitively, the agent or Person is not a highly informative cue to verb meaning; therefore, it is relatively easier to ignore that pattern compared to the Scene conditions.

5. Future Directions

The current study so far has not confirmed positive transfer between Spanish and English in the domain of verb learning and verb type accuracy during language acquisition in children. In fact, the data demonstrates monolinguals performing marginally better in the Path conditions than monolinguals. At this point it is unclear if these results are from confounding variables in the method of the study or if there are deeper effects of cognitive processing at play here. One possibility of a confounding variable could be general discomfort of bilingual children in a “testing” environment. Spanish-English bilingual children are likely pulled for testing quite a bit and may be subject to judgmental attitudes from less than tactful administrators. If children are uncomfortable in the setting of the experiment, their performance may not reflect their true competence. Though the original study is kid-friendly, future versions of this study may include a few very simple and silly practice trials before the actual experiment begins. This would serve to help the child warm up to the experimenters and prepare them for the format of the task. In addition to continuing to run participants on the current study to increase statistical power, there are several follow up studies that would add interesting insight to the question of this work.

Regarding the possibility that a bilingual’s code-switching may include adopting a Manner bias, a way to resolve this confound would be to run the experiment in Spanish. One may replicate the original study, but have the items in Spanish and run Spanish-English Bilinguals compared to Spanish Monolinguals. If the negative effects shown in the current study are due to some sort of delay based on bilingual cognitive load, or due to methodological factors of the sample or procedure, the bilingual participants will also show lower accuracy in Path

forms in Spanish compared to Spanish monolingual participants. On the other hand, if the negative effect is due to the fact that bilinguals adopt, and perhaps even overgeneralize, Manner bias in English, then they should have Path verb accuracy that is on par with their Spanish monolingual peers in Spanish.

In addition to some corrective changes to the original study, some new directions can be explored from the results. In the experiments conducted so far, the participants have fallen within the ages of 4;0 and 7;11. As reviewed in the literature this is within the age window that language-specific verb-type bias begins to emerge. A possible follow up study may involve extending the age range to younger children and infants to see the development of verb type bias development over time. This could be accomplished using a preferential looking paradigm in infants.

From an in-depth review of the literature, this study seems to be the first of its kind. No other studies have integrated the fields of typology, verb acquisition, and bilingualism into a comprehensive task. Though the data did not yield the hypothesized effects of acceleration in bilinguals in the domain of verb-type distinction, the topic is interesting and worth continuing to explore. The more that scholars, clinicians, and families know about how language emerges in bilingual children, the better curricula will be developed. Eventually, all multilingual children can avoid prejudices that stunt their linguistic development and will grow to use their skill as the advantage that it is.

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Appendix A

Scripts for Procedure for Orders 1 and 2

Order 1: Hi, (student name)! We're gonna watch a few videos today.

These videos are going to teach you about some silly words and what they mean. You're going to see three clips that show you people doing these words. The first one is called rizzing. Ready? (show first videos) Now you're going to see two more videos side by side. All you have to do is watch what they're doing and tell me which one you think is rizzing. Are you ready? (show test)

Do you understand how to do the game? The three videos show you what rizzing is and then you choose which one of the last two is rizzing. Great job!

Ok, now that I know you've got it, here's another word.

Order 2: Hi, (student name)! We're gonna watch a few videos today.

These videos are going to teach you about some silly words and what they mean. You're going to see three clips that show you people doing these words. The first one is called quibbing. Ready? (show first videos) Now you're going to see two more videos side by side. All you have to do is watch what they're doing and tell me which one you think is quibbing. Are you ready? (show test)

Do you understand how to do the game? The three videos show you what quibbing is and then you choose which one of the last two is quibbing. Great job!

Ok, now that I know you've got it, here's another word.

Appendix B

Verb Items and Their Condition Elements

Item 1: <i>Rizzing</i>	Path/Person	'go out of'
Item 2: <i>Kalloonig</i>	Manner/Scene	'crawling'
Item 3: <i>Plogging</i>	Manner/Person	'somersaulting'
Item 4: <i>Vorping</i>	Path/Scene	'come down/toward'
Item 5: <i>Blanging</i>	Path/Person	'go up/away'
Item 6: <i>Tilking</i>	Manner/Person	'running'
Item 7: <i>Frasking</i>	Path/Scene	'go into'
Item 8: <i>Quibbing</i>	Manner/Scene	'hopping'