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The boundary-crossing constraint revisited: movement verbs across varieties of Spanish

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Abstract: Talmy divided the world's languages according to how they express movement. Spanish, a verb-framed language, purportedly constrains the use of motion verbs expressing the manner of movement (such as *roll*) to contexts in which no spatial boundary is crossed. Previous research suggests that this constraint sometimes does not apply. We report the first large-scale investigation of the constraint and its modulating factors (movement direction, verb type, entering/exiting, Ground size, the preposition used) across different Spanish-speaking communities. A task with open-ended description of animated videos, a sentence interpretation task, and a rating task found that Spanish and Latin American speakers (n = 180 in total) often use manner verbs to describe boundary-crossing situations (especially entering a place), although this is modulated by the preposition following the verb (more with *a* than *en*). Better understanding of this constraint in verb-framed languages has applications in, for instance, L2 acquisition research.

Keywords: verb-framed language; boundary-crossing constraint; varieties of Spanish; verbal constructions

1 Introduction

The concept of boundary crossing refers to "overcoming a physical boundary that a moving Figure encounters" (Filipović 2007: 37). Since crossing a boundary requires some type of movement, it is closely related to what Talmy called a *Motion Event*, which consists of "one object (the Figure) moving or located with respect to another object (the reference object or Ground)" (Talmy 2000: 25). Other components necessarily present in the Motion Event are the Motion itself, since a Figure can either move in the same location with respect to the Ground (*self-contained motion*) or can change its location (*translational motion*), and the Path, which indicates the trajectory of the Figure in the Motion Event. In order to elaborate the event, optional

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components such as Manner and Cause (and additionally, according to Zlatev and Yangklang 2004: 163, also Velocity, Vehicle, etc.) can be added. The Manner denotes the way the Figure is moving and the Cause, the reason for the movement.

(1) *Alicia corr-e hacia la casa.* [Spanish]
Alicia run-PRS.IND.3SG towards DET.F house
'Alicia is running towards the house.'

In the Spanish example (1), the Figure of the Motion Event is *Alicia*, the Ground is *la casa* 'the house', the Motion is conflated with the Manner in the main verb, *corre* 'is running', and the Path is expressed in the preposition *hacia* 'towards'. On the basis of the mapping of the semantic components Path and Manner onto main verbs or so-called *satellites* in different world languages, Talmy (1985, 1991, 2000) created a typology in which languages are divided into two groups: satellite-framed languages and verb-framed languages. Satellite-framed languages, such as Slavic or Germanic languages, usually map the Manner onto the root of the main verb and the Path onto a satellite, such as a particle or a prefix. In contrast, verb-framed languages, such as Romance languages, typically map the Path onto the root of the main verb and the Manner, if it is present at all, onto a separate element such as a gerund. In (2), an example from a satellite-framed language, Czech, taken from Martínková (2018: 40), the Manner is expressed in the root of the main verb *plula* 'floated' and the Path in the prefix *v-* 'into', while in (3), an example from Spanish, a verb-framed language, taken from Talmy (1991: 487), the Manner is denoted in the separate constituent *flotando* 'floating' and the Path is denoted in the main verb *entró* 'entered'.

(2) *Láhev v-plu-la do jeskyně.* [Czech]
Bottle into-float-PST.F.SG into cave
'The bottle floated into the cave.'
(Martínková 2018: 40)

(3) *La botella entr-ó a la cueva flotando.* [Spanish]
DET.F bottle enter-PST.3SG to DET.F cave floating
'The bottle floated into the cave.'
(Talmy 1991: 487)

Although these prototypical structures are acquired first and used more frequently by native speakers, it is also possible in a verb-framed language to express the Manner in the main verb, e.g., *el conejo se escabulló en el jardín* 'the rabbit sneaked into the garden' (Hijazo-Gascón et al. 2019: 323). Previous literature has pointed out several issues with Talmy's (2000) typology, summarised in Hijazo-Gascón (2021:

40–59), that concern, among other things, the vague definition of a satellite, the variation found between languages of the same type as well as between types, and the main matter of this paper, the *boundary-crossing constraint* (BCC).

Aske (1989), differing from what Talmy theorised in his typology, noticed that Spanish allows main manner verbs to describe Motion Events that occur within a single space, such as *en la casa* 'in the house' or *hacia el bosque* 'towards the forest'. However, if the Motion Event is telic, that is, the beginning, development, or result of an action is explicit, such as *a la casa* 'into the house' or *del edificio* 'from the building', main manner verbs are not allowed. Considering examples such as *corrió hasta la casa* 's/he ran up to the house', Slobin and Hoiting (1994: 496) coined the term *boundary-crossing constraint*, stating that in verb-framed languages Manner can be mapped onto the main verb as long as the Figure does not cross a boundary. According to this constraint, a sentence such as *Sofía rodó en la habitación* will be interpreted as 'Sofía rolled inside the room', and not 'into the room'. For the latter interpretation, in a verb-framed language such as Spanish, a main path verb is needed: *Sofía entró en la habitación rodando* 'Sofía entered the room rolling' (Cadierno and Hijazo-Gascón 2014: 101). And *Sofía rodó a la habitación* is interpreted as 'she rolled up to the room (she approached it but did not enter)'.

Some previous studies (e.g., Martínez Vázquez 2001; Naigles et al. 1998; Özçalışkan 2015), reviewed below in Section 2.2, suggest that the boundary-crossing constraint does not apply in all cases in verb-framed languages. The purpose of the current study was to provide an empirical test, which has hitherto been lacking, of whether the BCC really applies in Spanish and to explore possible factors that may modulate the acceptability of boundary-crossing readings of manner verbs, as hinted at by some previous studies. Our informal observations suggest that there may also be differences regarding the BCC in different varieties of Spanish, an area that is underexplored, since, to the best of our knowledge, there has not yet been any study about boundary crossing with a diatopic focus. Diatopical variation in the expression of motion has been found between two varieties of German (Berthele 2004), e.g., in the frequency of use of manner verbs. For varieties of Spanish, Ibarretxe-Antuñano and Hijazo-Gascón (2012) suggest that speakers of Aragonese Spanish and Basque Spanish seem to express more pieces of path information than other Spanish varieties. However, their small sample size (only six narratives per variety) makes their results hard to generalise from. In Section 2.1, we will first review literature dealing with the BCC from the point of view of second language acquisition and translation, as it offers insights into the importance of the BCC for verb-framed languages and, after that, we will present literature questioning the constraint in verb-framed languages.

2 Background

2.1 (Un)learning the boundary-crossing constraint

In this section previous studies about the acquisition and translation of boundary-crossing events are reviewed, since a large body of literature available on the BCC took a cross-linguistic perspective. According to the Thinking for Speaking (TFS) hypothesis proposed by Slobin (1996a), the Talmian language type will influence what speakers pay attention to while speaking, since they are limited by the available linguistic forms of their language. Slobin proposed that the TFS patterns will be transferred from the first language (L1) when a second language (L2) is being learned. A large amount of research has examined whether, or to what extent, learners will be able to acquire the L2 TFS patterns (e.g., Cadierno 2010; Cadierno and Ruiz 2006; Hasko 2010; Hijazo-Gascón 2018; Lewandowski and Özçalışkan 2021; Stam 2010). When one zooms into the literature addressing boundary-crossing events, the two main areas on which previous studies have focused are: (i) finding out whether L2 learners are influenced by their L1, that is, whether they transfer patterns from their L1 (Alonso 2013; Muñoz and Cadierno 2019) and, in some cases, testing whether there is an advantage for learners whose L1 is typologically similar to the L2 (Cadierno 2010; Cifuentes-Férez and Molés-Casés 2020); (ii) testing if incidental learning and unlearning of the boundary-crossing constraint from the input occurs (Alghamdi et al. 2019; Treffers-Daller and Calude 2015). Some of these studies also test if learners are closer to native norms when their proficiency level is higher.

Cadierno (2010) analysed how Spanish, Russian, and German learners of Danish as an L2 with an intermediate level described Motion Events with boundary crossing in their L2. Cadierno asked whether the L1 would influence the patterns of the participants' L2, since Russian, German, and Danish are part of the same group (satellite-framed languages), whereas Spanish is a verb-framed language. The results showed that those learners whose L1 matched the L2 in being satellite-framed (i.e., Russian and German) did better than those whose L1 (Spanish) is typologically different from the L2, Danish.

Muñoz and Cadierno (2019) examined bidirectional transfer between Spanish and English in both boundary-crossing and 'non-crossing' situations. An innovation in comparison with previous studies was that the stimuli they used for eliciting motion-event descriptions were realistic and dynamic rather than static. They found that English learners of L2 Spanish were influenced by the L1 patterns in their L2 production of Motion Events both in boundary-crossing and non-crossing situations, regardless of their proficiency level. They found influences of L2 in the learner's L1, at least partially (Muñoz and Cadierno 2019: 61).

Regarding the translation of descriptions of boundary-crossing events, both Alonso (2013) and Cifuentes-Férez and Molés-Casés (2020) found similar results. On the one hand, Alonso (2013) examined translation from Spanish to English by Spanish students of translation with a C1 level in their L2 English and found that Manner tended to be mapped onto a separate constituent and not the main verb, indicating transfer from the L1 to the L2. On the other hand, Cifuentes-Férez and Molés-Casés (2020) examined the translation from English to their L1 by Spanish or German translation students and found that the German translators did better than the Spanish translators since the loss of Manner information was less frequent and the crossings were expressed more often. Thus, even advanced students were influenced by their motion-event L1 patterns in the L2. Regarding the Spanish translations in the latter study, the Manner was more often lost in vertical and slow boundary crossings, while in quick crossings the Manner information was more often preserved.

Treffers-Daller and Calude (2015) tested whether the frequency of different movement verbs in (L1 English) learners' (L2 French) input determines the frequency of the movement verbs in the learners' own L2 output. Their results indicate that, in general, the input frequency helps because the most frequent movement verbs in the input are also the most frequent in the learners' output, and the more advanced the learners were, the closer they got to L1 speakers' use of specific movement verbs. However, one exception to the frequency benefit found in this study was the boundary-crossing constraint, since most of the English learners of L2 French did not respect the restriction in the oral elicitation task, and even the more advanced learners were not found to be better than the less advanced ones. Thus, the results suggested that the lexical frequency of motion verbs in the input is not enough for acquiring the BCC.

Alghamdi et al. (2019) focused their study exclusively on boundary-crossing situations comparing English speakers, who preferred a manner verb in describing boundary crossings in their L1, with Arabic speakers, who preferred other constructions in their L1, such as path verbs or not mentioning the crossing. The L1 Arabic learners of L2 English, whose L1 is a verb-framed language and whose L2 is a satellite-framed language (i.e., they had to unlearn the constraint), were somehow in between, being more similar to native English speakers as their level of English increased. When measuring incidental learning, the researchers discovered that L2 motion verb frequency, as measured using the *British National Corpus*, did not predict the use of manner verbs in boundary-crossing situations by these learners. Even the most advanced learners acquiring English in immersion settings could not completely learn the L2 patterns from the input, and this, together with the probable lack of negative feedback from teachers which is "normally not given as the learners produce grammatically correct structures albeit different from the preferences of the target language" (Alghamdi et al. 2019: 99), highlights the need to teach the target

forms explicitly. Laws et al. (2021) showed that a treatment based on the principles of the Input Processing methodology (Lee and VanPatten 2003; VanPatten and Cadierno 1993) helped learners of L2 English with different verb-framed L1s to unlearn the boundary-crossing constraint in English.

From the studies reviewed so far, it can be concluded that learners are clearly influenced by their L1 when expressing Motion Events with boundary crossing in their L2, especially if the L1 and L2 are from typologically distinct groups, and that the role of both the language proficiency and the lexical frequency of motion verbs is limited, because even for L2 users with a high proficiency level, and even for high-frequency target forms, the BCC still remains a challenge.

2.2 The boundary-crossing constraint revisited

In the previous section we reviewed research showing that the native language patterns of encoding boundary-crossing events exert a strong influence on production in a second language. Despite the clear role of the BCC cross-linguistically, a number of studies stand in opposition to the full validity of the BCC in verb-framed languages. The first researchers to notice the violation of this restriction were Naigles et al. (1998), when comparing how Spanish and English speakers described scenes with boundary crossings: "For the horizontal boundary events, this was the case: 100 % of the responses with *a*, *de* or *para* (*n* = 40) occurred with path verbs […]. However, for the vertical boundary events, 97 % of the responses with *a*, *de* or *para* occurred with manner verbs" (Naigles et al. 1998: 542). They concluded that the reason might be that in verb-framed languages, manner verbs are allowed in vertical boundaries and/or in involuntary motion, such as in scenes where a Figure jumps into a pool, in which the motion event is initiated intentionally but the boundary crossing itself is not intentional any more. Martínez Vázquez (2001: 43) documents other examples in Spanish where a manner verb is used in boundary crossings in the CREA corpus; see example (4):

(4) *La cabeza de Robespierre rodó en el cesto de la guillotina…*
'Robespierre's head rolled into the basket of the guillotine…'
(Martínez Vázquez 2001: 43)

Özçalışkan (2015) compared how native speakers of English (a satellite-framed language) and of Turkish (a verb-framed language) described scenes with boundary crossings in their L1. The author concludes that the constraint is accurate as a test of whether a language belongs to one type or the other, since the English speakers produced more manner verbs (except in a scene where the Figure unintentionally

falls into a net) and fewer path verbs in boundary crossings than the Turkish speakers did. However, in some contexts the Turkish speakers did use manner verbs in boundary-crossing contexts, namely quick or instantaneous crossings, such as *dive into a lake* or *leap over a hurdle*, though the Turks never used manner verbs "in the description of activity-type events that are temporally extended (e.g., *crawling*, *walking*, *running*)" (Özçalışkan 2015: 496). Another factor that might play a role, according to this author, is the character of the boundary, since the crossings of fluid boundaries (e.g., between air and liquid, such as *jump into a pool*) were more frequently described with a manner verb and more manner verbs were used to express crossing over an unenclosed bidimensional boundary (such as *leap over a hurdle* or *flip over a beam*) in comparison with crossing out of or into a space.

The categorisation of verbs as either manner or path verbs remains a challenge. Zlatev and Yangklang (2004: 167) wrote about the verb *fall*, which was considered a path verb by Slobin (1996b) since it mainly indicates movement downwards, but it can be argued that it also indicates manner since the movement is through the air (or another medium) and it indicates the Figure's loss of control. That is the reason why Zlatev and Yangklang proposed an intermediate category called "Manner + Path verbs" (2004: 167). Lewandowski and Mateu (2020) proposed a semantic continuum of verbs: path verbs (e.g., *exit*) > directional manner verbs (e.g., *walk*) > pure manner verbs (e.g., *float*) > non-motional manner verbs (e.g., *whistle*). The difference between directional and pure manner verbs is that directional manner verbs imply a change of location, while pure manner verbs do not necessarily do so. For testing the acceptability of the use of either directional or pure manner verbs followed by the preposition *a* 'to' by Spanish native speakers, Lewandowski and Mateu (2020) conducted an acceptability judgement task with Spanish native speakers (n = 20) from different countries. These Spanish speakers rated as acceptable sentences with a directional manner verb followed by the preposition *a*, such as *Juan corrió al baño* 'John ran [in]to the bathroom', while they rated as unacceptable sentences with a pure manner followed by the preposition *a*, such as *Juan bailó a la habitación* 'John danced [in]to the room'. According to these authors, while the preposition *a* indicates that the Figure is "in contact with the exterior boundary of the [G]round" (Lewandowski and Mateu 2020: 12), the preposition *en* 'in' indicates that the Figure is inside the Ground or on its surface (*en el cajón* 'in the drawer' or *en la mesa* 'on the table'). This study did not have enough participants for it to be possible to check whether there were any differences between varieties of Spanish in the use of the preposition *a* with directional or pure manner verbs. There are studies on the alternation of Spanish prepositions with path verbs, such as Ibarretxe-Antuñano's study (2003) on *entrar en/a* 'enter in/to' which proposed semantic differences based on Talmy's force dynamics (Talmy 1988) and on Langacker's profiling (1987, 1991,

2000 cited in Ibarretxe-Antuñano 2003), such as deictic differences (Ibarretxe-Antuñano 2003: 48). Other authors argued that the choice between *en/a* ('in/to') with verbs that denote movement into a place (e.g., *entrar* 'enter') is a matter of diatopic variation, the preposition *a* being preferred in Latin American varieties (for a review, see Eslava Heredia 2012).

Beavers et al. (2010: 362–365) emphasise the role of context and, by means of a review of several studies, they enumerate factors that might influence the interpretation (either locative or directional) of the prepositions in different languages: the proximity of the Figure to the Ground, the type of Ground (an enclosed space with clear boundaries or open space), punctual actions as opposed to processes, different types of manner verbs (pure vs. directional), Manner prominence, etc.

The goal of the present study is to test whether speakers of Spanish (both Peninsular and Latin American) use manner verbs to describe boundary-crossing motion events (production) and whether they interpret manner verbs as descriptions of boundary crossings (comprehension). In addition, on the basis of the previous studies reviewed above, we test which specific factors may modulate the acceptability of manner verbs for boundary-crossing meanings. Specifically, this study addresses the following research questions and subquestions:

1. Do speakers of Spanish use manner verbs as main verbs when describing dynamic scenes with boundary-crossing situations? Is the probability of using a manner verb to describe boundary-crossing events higher for movement towards the inside of an enclosed space as opposed to exiting a space?
2. Do speakers of Spanish rate (on a five-point Likert scale) as suitable sentences with main manner verbs describing the same dynamic scenes with boundary-crossing situations? Are there differences between the ratings of different verbal constructions (see Section 3.3) or the usage of the prepositions *en* 'in', *a* 'to' and *de* 'out of'?
3. Do speakers of Spanish interpret as instances of boundary-crossing sentences with main manner verbs? Is the boundary-crossing interpretation with directional manner verbs (*run*, *walk*) more likely than with pure manner verbs (*float*, *roll*)? Is the boundary-crossing interpretation with small Grounds (*la ardilla trepó en el pequeño hueco* 'the squirrel climbed upwards in(to) the small hole') more likely than with larger Grounds (… *en la casa del árbol* '… in(to) the treehouse')? Is the boundary-crossing interpretation more likely with vertical than with horizontal movements?

For each of these three questions and their respective subquestions, we also asked whether there are differences between different varieties of Spanish.

3 Methodology

This study tested both production and comprehension of sentences describing boundary-crossing events in Spanish. Task 1 elicited the research participants' open-ended descriptions (i.e., production) of events shown in short videos. These videos were displayed again in Task 3 along with sentences whose suitability as descriptions of each video the participants were asked to rate (i.e., sentence comprehension). These tasks were separated by Task 2, a multiple-choice sentence interpretation task designed to test the importance of specific factors (the semantics of the motion verb, such as directionality, prepositions used, Ground size) for the acceptability of boundary-crossing readings of manner verbs. The order of the tasks was fixed for all the participants to ensure that the stimuli presented in the comprehension tasks (Task 2 and Task 3) could not affect the participants' own production in Task 1.

3.1 Participants

A total of 180 native Spanish speakers took part in the study. An additional 15 participants were recruited and completed the experiment, but they were excluded because either they failed the attention checks (n = 11) described in the next section, 3.2. Procedure, or Prolific categorised their performance as 'timed-out', i.e., they took longer than 67 min (n = 4). Eighty-eight participants from Spain, 66 from Mexico, 20 from Chile, and six from other Latin American countries completed an anonymous online survey made with Google Forms. The participants were recruited using the online research platform Prolific (https://www.prolific.co/) during the month of September 2022. They were rewarded financially for completing the survey. The study was distributed among the pool of registered participants on Prolific (the *Standard sample* option) and the inclusion criteria were as follows: nationality (all Spanish-speaking countries), first language (Spanish), fluent languages (Spanish), raised as monolingual, language-related disorders (none), earliest language in life (Spanish), and approval rate on previous studies on Prolific (minimum approval rate 70 out of 100). The study was run in two rounds to make sure that the number of participants was balanced between speakers from Spain and from Latin America. The participants could use a mobile, tablet, or desktop for completing the survey, and they took 19.69 min on average to complete it. Out of the total 180 participants, 62 identified as female and 118 as male. The participants' mean age was 29.6 years, SD 9.27 (for the participants from Spain it was 31.3, SD 10.3, range 19–66, and for those from Latin America it was 28.0, SD 7.88, range 19–68).

3.2 Procedure

After consenting to participate in the study, recording their Prolific ID, and responding to a question checking the fulfilment of the main requirement for participation (namely *Is Spanish your native language?*), the participants completed a survey in Google Forms comprising three tasks in a fixed order: Task 1 was an open-ended description of videos depicting boundary-crossing scenes, Task 2 was a multiple-choice task with sentences containing main manner verbs in which the participants were asked to choose between interpretations of these sentences either involving a boundary crossing or not, and in Task 3 the participants rated (on a five-point Likert scale) the suitability of different sentences for describing the same videos that had been presented in Task 1. For the data collection of Task 1 and Task 3 a set of ten animated videos was made. A printable version of the survey with the three tasks, as well as the set of animated videos, is available at https://osf.io/9tquh/.

In Task 1, the participants were instructed to watch a video and describe what had happened in a short sentence. An example was provided with a similar video not depicting a boundary-crossing event. Figure 1 shows screenshots of the ten target animated videos, lasting between 4 and 10 s, that were made (using the Procreate software) specifically for the present study to investigate Motion Events with boundary crossings. Five videos depicted motion into a place and five out of a place for each of the following actions: running, crawling, flying, jumping, and falling. The first four scenes, as ordered in Figure 1, show horizontal boundary crossings, scenes numbers 1 and 2 capturing quick crossings, 3 and 4 slow crossings. The rest of the scenes show vertical boundary crossings: 5 and 6 depict intentional slow crossings, 7 and 8 intentional (at least at the beginning of the movement in 7) quick crossings, and 9 and 10 depict unintentional and quick or instantaneous crossings. The order of the videos presented in Task 1 was random, but fixed for all participants, and it was as follows: scenes 1, 7, 10, 4, 5, 2, 9, 3, 6 and 8.

In Task 2, 26 short sentences containing main manner verbs, plus four fillers used as attention checks (Curran and Hauser 2019), were presented (after brief instructions for completing the task) to the participants, who were asked to choose one of the four following options according to their own interpretation of each sentence: a) a paraphrase of the boundary-crossing interpretation of the sentence, b) a paraphrase of its non-boundary-crossing interpretation, c) both meanings are possible, and d) I don't understand the meaning of the sentence. The attention checks were for screening out careless participants: those who failed two or more attention checks through the experiment (there was an additional one in Task 3) lost their entitlement to the monetary compensation in Prolific and all of their responses were

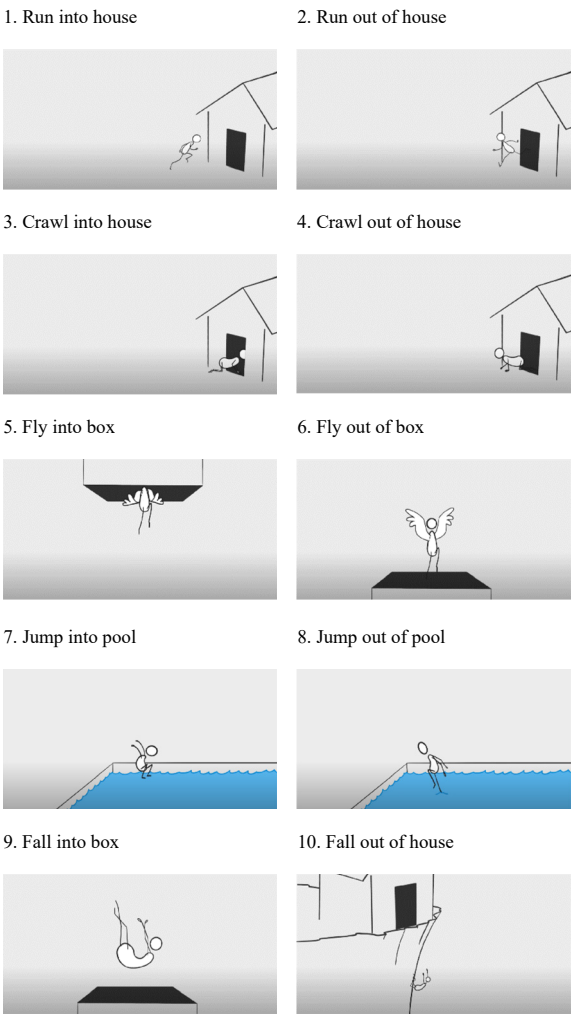

Figure 1: Screenshots of the short videos in the critical moment of the boundary crossings.

excluded from the study. Example (5) gives four of the sentences used, variants of each other, with potential vertical boundary crossings into a clearly defined space and with directional manner verbs (Lewandowski and Mateu 2020). Out of them (5a) and (5b) present a small Ground, whereas (5c) and (5d) present a large Ground; (5a) and (5c) include the preposition *a* 'to,' whereas (5b) and (5d) include the preposition *en* 'in.' Appendix 1 lists all of the 26 target sentences used in Task 2. It can be seen that the other sentences included, as main verbs, pure manner verbs (Lewandowski and

Mateu 2020), with a potential horizontal crossing either into or out of a space, the latter with the preposition *de* 'out of'.

(5) a. *La ardilla trepó al pequeño hueco del árbol.*
'The squirrel climbed upwards to/into the small hole in the tree.'
b. *La ardilla trepó en el pequeño hueco del árbol.*
'The squirrel climbed upwards in/into the small hole in the tree.'
c. *La ardilla trepó a la casa del árbol que construimos el año pasado.*
'The squirrel climbed upwards to/into the treehouse that we built last year.'
d. *La ardilla trepó en la casa del árbol que construimos el año pasado.*
'The squirrel climbed upwards in/into the treehouse that we built last year.'

The response options in Task 2 varied according to the sentence to be interpreted; e.g., for the sentence (5a) the options were: *la ardilla entró al hueco desde fuera* 'the squirrel entered into the hole from the outside', *la ardilla se acercó al hueco pero no entró* 'the squirrel approached the hole but did not enter it', *ambos significados son posibles* 'both meanings are possible', and *no entiendo el significado de la frase* 'I do not understand the meaning of the sentence'.

In Task 3, after brief initial instructions, the participants first had to watch the same videos as those presented in Task 1, but in a different order, which was again fixed for all participants, namely scenes 6, 9, 1, 8, 3, 5, 2, 7, 4 and 10. After rewatching each video, they had to read and rate for suitability three or four short sentences (three sentences for videos depicting movement out of a place and four for movement into a place), each offered as a potential description of what had happened in the video. A five-point Likert scale was used, with 1 corresponding to *very unsuitable description* and 5 to *very suitable description*. When the Figure crossed a boundary and entered a place, two of the sentences offered used the typical pattern of a verb-framed language (Talmy 1985, 1991, 2000), i.e., a main Path verb and a separate element, out of which one used the preposition *a* 'to' and the other one the preposition *en* 'in'. The other two sentences used the typical pattern of a satellite-framed language, i.e., a manner verb followed either by the preposition *a* 'to' or *en* 'in'. See example (6) for the proposed descriptions of the video of a Figure running into a house:

(6) a. *Entró corriendo a la casa.*
'She/he entered the house running.'
b. *Entró corriendo en la casa.*
'She/he entered the house running.'
c. *Corrió a la casa.*
'She/he ran to/into the house.'
d. *Corrió en la casa.*
'She/he ran in/into the house.'

For videos of a Figure crossing a boundary and leaving a space, sentences following the prototypical pattern of a verb-framed language (*salió gateando de la casa* 'she/he exited the house crawling') and sentences following the prototypical satellite-framed pattern (*gateó de la casa*, 'she/he crawled out of/away from the house') were offered for rating. There was also one attention-check item in Task 3, unrelated to the video with which it was presented.

The study was first piloted with Spanish-speaking friends via privately sharing a link to the online survey. After the study had been piloted with 27 participants, each of whom was debriefed, some attention checks were changed, and the option of *I do not understand the meaning of the sentence* was added to Task 2, along with other minor edits. The data from the pilot was entirely excluded, since some of the participants might have known the purpose of the study right from the beginning.

3.3 Coding

This section explains the labels used for coding the verbal constructions used by the participants in the open-ended description task (Task 1). The labels can also be seen in Table 1 of the results section below, where there are additional examples taken from the data.

- *Manner verb*: in this category sentences describing the boundary crossing with main manner verbs, such as *arrastrarse* 'to crawl' or *saltar* 'to jump', were included.
- *Manner + Path verb*: sentences with main *Manner + Path verbs* as defined by Zlatev and Yangklang (2004: 167), such as *caer(se)* 'to fall' or *huir* 'to flee/run away', are included in this category.
- *Path verb*: sentences where a path main verb was used, such as *David entra en casa* 'David enters the house,' including sentences with gerunds, such as *Persona entrando en casa* 'Person entering the house', because the gerund clearly indicates the crossing.
- *Path verb… Manner element*: here sentences with the prototypical verb-framed construction pattern were included, i.e., a path main verb and a separate manner element, such as *Juan entró corriendo a la casa* 'Juan entered the house running'.
- *Other*: participants' sentences that did not clearly express the boundary crossing were included in this category, i.e., sentences with *until*-markers (Beavers et al. 2010) such as *hasta* 'until' or sentences with prepositions that do not entail a boundary crossing, such as *hacia* 'towards'; see Table 1 for an example of this; sentences with gerunds as main manner verbs where the participants are clearly focussing on the process and not the crossing itself, such as *corriendo a casa*

'running to the house'; sentences in the present tense that do not mention the Ground, such as *David gatea* 'David is crawling' or in the past but without mentioning a clearly-defined enclosed Ground, such as *El ángel voló al cielo* 'the angel flew to the sky'; sentences where both the Path and the Manner are expressed in two main verbs that are not part of the same sentence, i.e., coordinated or subordinated sentences, such as *David corrió y entró a la casa* 'David ran and entered the house' or *Adrián cae por el precipicio al salir de su casa* 'Adrián fell from the cliff when exiting his house'; sentences without any verb, such as *dramática caída* 'dramatic fall'; and sentences that did not describe what happened in the video, such as *David es Jesucristo* 'David is Jesus' or did not describe any movement, such as *día de verano* 'summer day'. In general, constructions that did not clearly belong to any of the other categories used were included in this category.

For Task 2, in which participants interpreted the meanings of sentences, only sentences with the construction from the category *Manner verb* were presented. Some of them incorporated pure manner verbs and others directional manner verbs, as defined by Lewandowski and Mateu (2020).

4 Results

All the (anonymous) data and the analysis script in R (Bates et al. 2015; Christensen 2022; R Core Team 2022; Singmann et al. 2022; Wickham 2016; Winter 2020) are available at https://osf.io/9tquh/.

4.1 Description production task

First, the open-ended descriptions of the videos depicting the boundary-crossing scenes produced by the participants in Task 1 were analysed. The responses that were elicited were coded for the verbal construction used (see Section 3.3), choosing between the options listed in Table 1.

Table 1: Types of verbal constructions used by participants in the open-ended description of videos depicting boundary-crossing scenes.

Verbal construction	Example	Meaning
Manner verb	*David gateó fuera de su casa.*	'David crawled out of his house.'
Manner + Path verb	*El muñeco cayó a la caja.*	'The doll fell into the box.'
Other	*El ángel voló hacia arriba.*	'The angel flew upwards.'
Path verb	*El monigote sale de la piscina.*	'The stickman gets out of the pool.'
Path verb… Manner element	*Diego salió corriendo de casa.*	'Diego left the house running.'

Figure 2 shows the percentage of each construction split by the participant's variety of Spanish. It can be seen that, irrespective of variety, approximately a quarter of the descriptions used either a Manner verb (e.g., *correr* or *gatear*) or a Manner + Path verb (as defined by Zlatev and Yangklang 2004; e.g., *caer* or *huir*) and less than a half of them used a Path verb with or without a separate Manner element to describe the boundary-crossing events shown in the videos.

The probability of the participants using a manner verb (i.e., the first two constructions in Table 1) as opposed to them not using one (i.e., the remaining three types of constructions in Table 1) in their descriptions was modelled by a mixed-effects logistic regression model with Variety of Spanish (Spain, Mexico, Chile, Other, sum coded for four levels, Other coded as –1, –1, –1), Crossing direction (sum-coded: entering into 1, exiting out of –1) and their interaction as the fixed effects, and Participant and Item as the random effects with varying intercepts. The model R formula was as follows:

$$\text{manner} \sim \text{variety} * \text{crossing direction} + (1 \mid \text{participant}) + (1 \mid \text{item})$$

Table 2 gives the model's coefficient estimates for the fixed effects and Figure 3 plots the values fitted by the model to this data. Regarding the random effects, the standard deviation estimated for by-participant varying intercepts was 1.090 logits and for by-item varying intercepts (n = 10) it was 1.617 logits. Since three statistical models in total (see below) were fitted for data elicited from the same participants, the alpha level was Bonferroni-corrected to 0.05/3 ≈ 0.0166. Crossing direction alone was not found to have a reliable overall effect on the probability of manner verb usage.

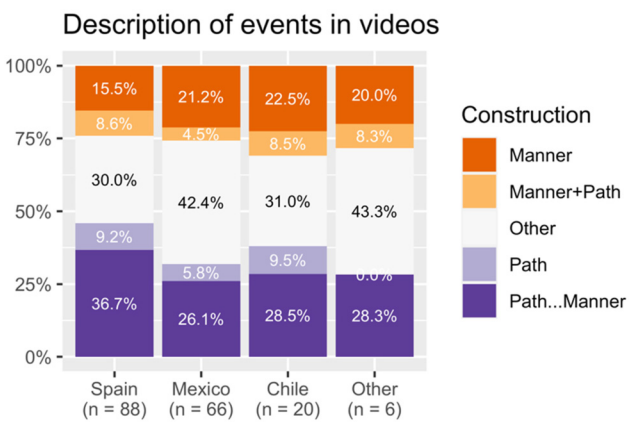

Figure 2: Percentages of verbal constructions of the different types elicited in Task 1 split by the participants' variety of Spanish.

Table 2: Coefficients estimated by the model of the probability of manner verbs in the participants' video descriptions.

	Estimate	*SE*	*z*	Pr(>|*z*|)
(Intercept)	−1.5739	0.5442	−2.8923	**0.0038**
country1 (Spain)	−0.2615	0.2049	−1.2764	0.2018
country2 (Mexico)	−0.1135	0.2132	−0.5323	0.5945
country3 (Chile)	0.2817	0.2829	0.9958	0.3193
direction1	0.7418	0.5260	1.4104	0.1584
country1:direction1	−0.0227	0.1280	−0.1772	0.8594
country2:direction1	−0.1379	0.1326	−1.0398	0.2984
country3:direction1	0.4617	0.1767	2.6125	**0.0090**

Values of Pr(>|*z*|) lower than the alpha level of 0.0166 are highlighted in bold.

However, a reliable effect was found for the participants from Chile (interaction term logit estimate: 0.46, *SE* = 0.18, *z* = 2.61, *p* = 0.009), and for the remaining varieties the raw counts of manner verbs used to describe *entering into* events were higher than those used to describe *exiting out of* events (cf. Figure 3).

The descriptions data was inspected for which specific manner verbs were used by the participants to describe the videos with boundary-crossing events. Figure 4 lists them all and it plots the raw counts of their occurrence, marking the construction type used. Table 3 then zooms into the six most frequent verbs (two of which were Manner + Path verbs), giving an example video description for each.

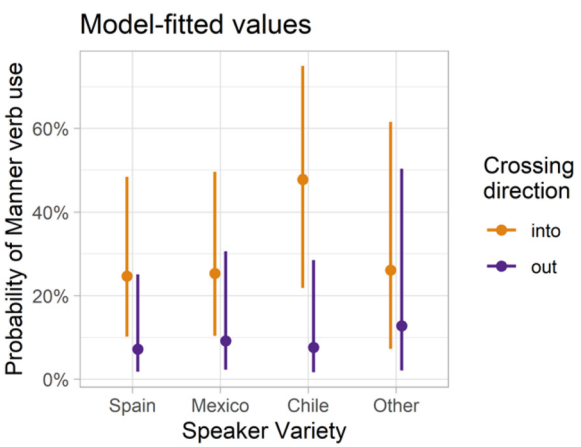

Figure 3: Values fitted by the logistic regression model of the probability of manner verbs in the participants' video descriptions split by Variety and Crossing direction. Error bars indicate 95 % confidence intervals.

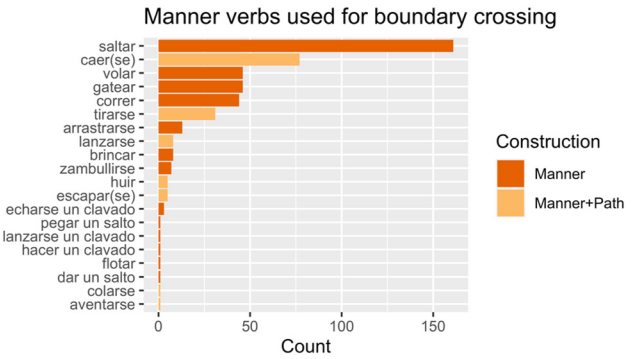

Figure 4: The count of occurrence of each manner verb used in the participants' video descriptions and the construction type used.

Table 3: Examples of video descriptions given by the participants for the six most frequent manner verbs used (as shown in Figure 4).

Manner verb	Example	Meaning
Saltar 'to jump'	*Saltó a la piscina.*	'She/he jumped into the pool.'
Caer(se) 'to fall'	*El niño cayó en una caja.*	'The boy fell into a box.'
Volar 'to fly'	*Persona alada vuela de una caja.*	'A winged person flies out of a box.'
Gatear 'to crawl'	*El niño gateó al interior de la casa.*	'The boy crawled into the house.'
Correr 'to run'	*Corrió a la casa.*	'She/he ran into the house.'
Tirarse 'to fling oneself'	*Juan se tiró a la pileta.*	'Juan flung himself into the pool.'

4.2 Description rating task

This section reports the participants' ratings of the suitability of the video descriptions presented in Task 3. These results are presented before those of Task 2 because the same videos were used as in Task 1. A mixed-effects ordinal logistic regression model was fitted to this data with the ratings (on a five-point Likert scale) as the response variable and verbal Construction type (Manner verb, Manner + Path verb, or Path verb … Manner element), Preposition (*a*, *de*, or *en*), and the participant's continent of origin (henceforth Origin; levels: Spain vs. Latin America), as well as their interactions as the fixed effects. Participant and Item were included as the random effects with varying intercepts. The two-level predictor Origin was used, rather than the four-level one Variety, in order to reduce the number of parameters estimated by the model. The model R formula was as follows:

$$\text{rating} \sim \text{construction} * \text{preposition} * \text{origin} + \left(1 \mid \text{participant}\right) + (1 \mid \text{item})$$

Table 4 gives the model's coefficient estimates for the fixed effects and Figure 5 plots the fitted values. As regards the random effects, the standard deviation estimated for by-participant varying intercepts was 0.8327 logits and for by-item varying intercepts (n = 36) it was 1.0364 logits. The analyses revealed a high probability of the best ratings of the suitability of a Manner verb in combination with the preposition *a* for describing the boundary-crossing scenes shown in the videos (specifically, the probability of response 4 or 5 was 0.90, computed as 1 – plogis (–2.1929), i.e., by applying the logistic function to the third intercept in Table 4 and subtracting from 1), about as high as it was for the Path verb … Manner element construction type (see Figure 5, upper leftmost and rightmost facets, respectively). Using a Manner verb in combination with the preposition *de* resulted in lower suitability ratings (logit difference: –2.50, SE = 0.75, z = –3.35, p = 0.0008) with the response probability showing a mild peak at response 4 (Figure 5, middle left), whereas using a Manner verb in combination with the preposition *en* resulted in clearly lower suitability ratings (logit difference: –5.01, SE = 0.75, z = –6.68, p < 0.0001) with the response probability culminating at the worst grade (Figure 5, lower left). The ratings of the suitability of the Manner + Path verb constructions to describe boundary-crossing events generally rose moderately towards the suitable end of the Likert scale, irrespective of the preposition used (Figure 5, central facets). Only two terms in the model estimate output out of those that included Origin were significant. Both involved the triple interaction between Construction, Preposition, and Origin, showing that the Latin American participants gave reliably lower ratings to the suitability of a Path verb … Manner element construction in combination with the prepositions *de* (logit difference: –1.05, SE = 0.30, z = –3.50, p = 0.0005) and *en* (logit difference: –1.65, SE = 0.31, z = –5.34, p < 0.0001) to describe boundary-crossing events than did the peninsular Spanish participants (see Figure 5, middle and lower right facets).

4.3 Sentence comprehension task

Finally, the participants' choices of the meanings of the sentences presented in Task 2 were analysed. Figure 6 shows the percentages of the interpretations chosen by participants with different varieties of Spanish. Recall that each sentence used a manner verb and offered three interpretations: one involving a boundary crossing, another one not, and one stating that both meanings were possible. The fourth option provided was always that none of the meanings matched the sentence, i.e., *I do not understand the meaning of the sentence*. Figure 6 shows that for each variety more than half of the responses chose interpretations with a boundary-crossing meaning (i.e., either the boundary-crossing interpretations offered or the *both meanings*

Table 4: Coefficients estimated by the model of the video description ratings.

	Estimate	*SE*	*z*	Pr(>|*z*|)
response1|response2	−4.6479	0.5408	−8.5952	**<0.0001**
response2|response3	−3.3586	0.5387	−6.2343	**<0.0001**
response3|response4	−2.1929	0.5374	−4.0806	**<0.0001**
response4|response5	−0.7404	0.5365	−1.3801	0.1676
constructionManner + Path	−1.166	1.1794	−0.9886	0.3228
constructionPath…Manner	0.5745	0.7139	0.8047	0.421
prepositionDe	−2.4965	0.7461	−3.3459	**0.0008**
prepositionEn	−5.0092	0.7504	−6.6756	**<0.0001**
originLatinAmerica	0.3747	0.2051	1.8274	0.0676
constructionManner + Path:prepositionDe	2.2205	1.4909	1.4893	0.1364
constructionPath…Manner:prepositionDe	3.0125	0.9505	3.1694	**0.0015**
constructionManner + Path:prepositionEn	5.5815	1.6669	3.3485	**0.0008**
constructionPath…Manner:prepositionEn	3.0673	1.0073	3.0451	**0.0023**
constructionManner + Path:originLatinAmerica	−0.1819	0.3259	−0.5581	0.5768
constructionPath…Manner:originLatinAmerica	0.0974	0.236	0.4129	0.6797
prepositionDe:originLatinAmerica	0.0081	0.2098	0.0384	0.9694
prepositionEn:originLatinAmerica	−0.2067	0.2224	−0.9294	0.3527
constructionManner + Path:prepositionDe:originLatinAmerica	−0.4077	0.4025	−1.0129	0.3111
constructionPath…Manner:prepositionDe:originLatinAmerica	−1.0454	0.2984	−3.503	**0.0005**
constructionManner + Path:prepositionEn:originLatinAmerica	−0.5909	0.4687	−1.2608	0.2074
constructionPath…Manner:prepositionEn:originLatinAmerica	−1.6483	0.3085	−5.3435	**<0.0001**

Values of Pr(>|*z*|) lower than the alpha level of 0.0166 are highlighted in bold.

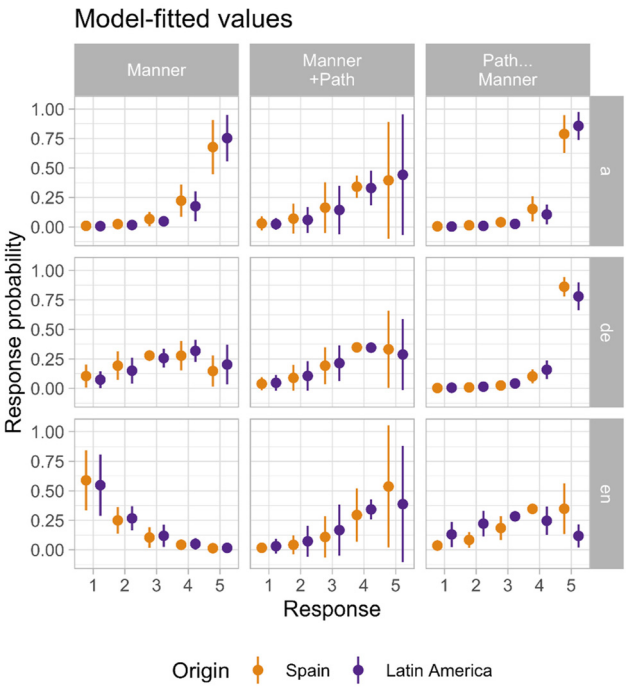

Figure 5: Values fitted by the mixed-effects ordinal logistic regression model for the participants' video description suitability ratings (1 = very unsuitable, 5 = very suitable) split by verbal Construction, Preposition, and continent of Origin. Error bars indicate 95 % confidence intervals.

possible option) and that the distribution of the interpretation options was similar across varieties (except for the minority of six participants in the *Other* category who had a somewhat higher percentage of the *both meanings* selections and a lower percentage of the *no crossing* selections).

The probability of the participants choosing a boundary-crossing interpretation (i.e., either the *boundary-crossing* option or the *both meanings possible* option) of the sentences in Task 2 (always with a manner verb) was modelled by a mixed-effects logistic regression model with Ground size (large vs. small), Verb type (directional vs. pure), movement Direction (horizontal, vertical upward, or vertical downward), Preposition (*a*, *de*, or *en*), and the participant's continent of Origin (Spain vs. Latin America) as the fixed effects, as well as Participant and Item as the random effects with varying intercepts. The model R formula was as follows:

$$\text{crossing} \sim \text{size} + \text{verbtype} + \text{direction} + \text{preposition} + \text{origin} + (1 \mid \text{participant}) + (1 \mid \text{item})$$

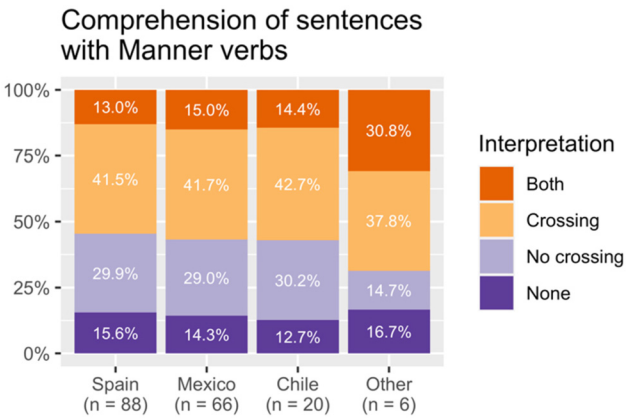

Figure 6: Percentages of the interpretations chosen by the participants for the sentences presented in Task 2 split by their variety of Spanish.

Table 5 gives the model's coefficient estimates for the fixed effects. As for the random effects, the standard deviation estimated for by-participant varying intercepts was 0.8558 logits and for by-item varying intercepts (n = 26) it was 1.0432 logits. None of the predictors was found to have a reliable effect on the probability of a boundary-crossing interpretation, with one exception, namely the preposition used. Figure 7 plots the predicted values for the different prepositions used. The probabilities for the preposition *a* (0.89, the Intercept in Table 5) and the preposition *de* (0.91) did not differ reliably, but the probability of a boundary-crossing interpretation for the preposition *en* (0.35) was much lower than that of *a* (logit difference: –2.74, SE = 0.47, z = –5.86, p = <0.0001).

Table 5: Coefficients estimated by the model of the probability of the participants choosing a boundary-crossing interpretation of the manner verb sentences presented in Task 2.

	Estimate	*SE*	*z*	Pr(>|*z*|)
(Intercept)	2.1265	1.3206	1.6103	0.1073
sizeSmall	0.1460	0.4292	0.3402	0.7337
verbtypePure	–1.3259	1.2114	–1.0945	0.2737
directionVerticalDownward	–0.4681	1.2899	–0.3629	0.7167
directionVerticalUpward	–0.5258	1.2917	–0.4071	0.6840
prepositionDe	0.1962	0.6570	0.2986	0.7652
prepositionEn	–2.7386	0.4674	–5.8594	**<0.0001**
originLatinAmerica	0.2085	0.1485	1.4042	0.1603

Values of Pr(>|*z*|) lower than the alpha level of 0.0166 are highlighted in bold.

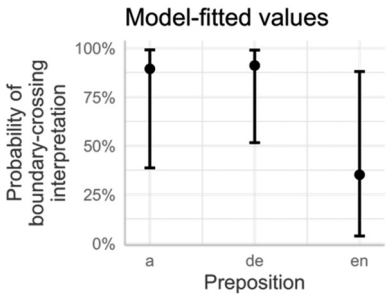

Figure 7: Model-predicted values of the probability of boundary-crossing interpretations chosen by participants in Task 2 for sentences containing different prepositions. The error bars indicate 95 % confidence intervals.

5 Discussion

The main aim of the current study was to examine how native speakers of different varieties of Spanish describe, rate, and interpret scenes and sentences with boundary-crossing events. According to the previous literature, since Spanish is a verb-framed language (Talmy 1985, 1991, 2000), the preferred pattern is to map the semantic component of Path onto the main verb and the Manner, if it is expressed, onto a separate element such as a gerund. Putatively, it is also possible to map Manner onto the main verb in verb-framed languages, as long as the Figure does not cross a spatial boundary (Slobin and Hoiting 1994): this is what has been called the boundary-crossing constraint. However, previous literature (e.g., Alghamdi et al. 2019; Naigles et al. 1998; Özçalışkan 2015) has questioned this restriction in some contexts (for Arabic, Spanish and Turkish respectively): they proposed that the BCC does not apply to quick and instantaneous crossings, where the Figure loses control over the movement, and to vertical movements. To investigate the contexts in which Spanish speakers can use main manner verbs, a set of ten animated scenes were created which depicted vertical as well as horizontal and intended and unintended boundary crossings. Another aim was to determine if there are differences between varieties of Spanish in this respect, considering that there have been studies that suggested typological differences between different varieties of a language (Berthele 2004; Ibarretxe-Antuñano and Hijazo-Gascón 2012), although, to the best of our knowledge, there have not yet been any studies of diatopical variation on the BCC. The last main objective was to shed light on the alternation of the prepositions *en* 'in/into' and *a* 'to/into,' since some authors suggested that a potential difference in the use of these prepositions is a matter of semantic variation (Ibarretxe-Antuñano

2003), while others ascribe it to a diatopical variation (for a review, see Eslava Heredia 2012). In addition, this study aimed to clarify the interpretation of the preposition *a*, since some authors claim that it has a locative reading whilst others claim that it has a directional reading (see Lewandowski and Mateu 2020 for a review). Some authors have drawn attention to the role that the context might play (Beavers et al. 2010), suggesting that a boundary-crossing interpretation might depend on the Ground size, the proximity of the Figure to the Ground, etc. To this end, 180 participants from different Spanish-speaking countries, recruited via the Prolific platform, completed an online survey with three tasks (an open-ended video description task, a sentence interpretation task, and a video description suitability rating task).

For the reader's convenience, here we repeat the first group of research questions verbatim. Do speakers of Spanish use manner verbs as main verbs when describing dynamic scenes with boundary-crossing situations? Is the probability of using a manner verb to describe boundary-crossing events higher for movement towards the inside of an enclosed space as opposed to exiting a space? The results showed that, irrespective of variety, approximately a quarter of the open-ended descriptions of the ten short videos depicting boundary crossings used either a main Manner verb or a main Manner + Path verb (as defined by Zlatev and Yangklang 2004, e.g., *caer* 'fall'), so the answer to the first question is affirmative for each of the varieties of Spanish well represented in this study (Spain, Mexico, and Chile). In the data that was elicited we found sentences with main manner verbs that described the boundary-crossing scenes even in non-instantaneous acts such as *crawling into a house* (e.g., *El niño gateó al interior de la casa* 'The kid crawled to the interior of the house'), in direct opposition to Slobin's (2004) statement: "[…] boundary crossing is a change of state and manner verbs are generally activity verbs. The only manner verbs that can occur in boundary-crossing situations are those that are not readily conceived of as activities, but rather as 'instantaneous' acts. Thus, one can 'throw oneself into a room' but one generally can't 'crawl into a room' in V-languages" (Slobin 2004: 226). Özçalışkan (2015) did not find any difference in the usage of manner verbs between crossings into versus out of a space in Turkish. In the present study, the raw counts of Manner verbs and Manner + Path verbs indicated that they were more commonly used to describe movements of entering into an enclosed space, rather than of leaving it, though statistically the effect was only reliable for the participants from Chile (n = 20) and not for the other varieties. Other than this, no reliable differences were found between different varieties of Spanish in this open-ended task. Interestingly, many speakers in this study used a manner verb followed by the Spanish preposition *a* for boundary-crossing descriptions, even though previous studies suggested that this preposition does not entail boundary crossing (e.g., Aske 1989).

The second group of research questions was as follows. Do the speakers of Spanish rate (on a five-point Likert scale) as suitable sentences with main manner verbs describing the same dynamic scenes with boundary-crossing situations? Are there differences between the ratings of different verbal constructions (see Section 3.3) or the usage of the prepositions *en* 'in', *a* 'to', and *de* 'out of'? The results of the rating task show that speakers rated as highly suitable descriptions of the animated boundary-crossing scenes (the same as those used in Task 1) that contained a main Manner verb followed by the preposition *a*, e.g., *corrió a la casa* 'she/he ran into the house', and what is more, this rating of Manner verb followed by *a* was as high as the rating of the prototypical verb-framed pattern, i.e., the verbal construction Path verb … Manner element, such as *entró corriendo a la casa* 'she/he entered the house running'. The ratings of descriptions with a main Manner verb followed by the preposition *de* 'out of' were intermediate and when one was followed by the preposition *en* 'into' they were low. Therefore, the suitability of the usage of a main Manner verb for describing boundary crossings varied depending on the preposition following the verb, although this was not the case for the other verbal constructions (i.e., Manner + Path verb and Path verb … Manner element, though for the latter, see the difference between peninsular and Latin American Spanish regarding *de* and *en*). This result suggests that a constructionist perspective (Goldberg 1995, 2003) may have to be taken into account in studies dealing with typology: the Manner verb was rated as highly suitable when followed by the preposition *a* but as unsuitable when followed by the preposition *en*, which also indicates a crossing into a space (at least when used with a Path verb, as in *Ana entró en la casa* 'Ana entered the house'), in contradiction to the pattern described by Talmy (1985, 1991, 2000) as preferred or prototypical in verb-framed languages. Sihna and Kuteva (1995) emphasise the importance of examining the whole construction and not just one element, as spatial meaning is distributed among the members of the construction. More and more research focuses on how the typological differences can be related to the constructional perspectives, especially in the study of the constructions used for caused motion events (e.g., Cadierno et al. 2023; Hijazo-Gascón et al. 2016; Ji et al. 2011). Gil and Soares da Silva (2023) investigated how goal-oriented motion verbs combine with prepositions and found out that motion verbs are important predictors of the prepositions used. The constructionist perspective has also been used as a teaching methodology for instruction on the expression of motion events by L2 learners (Caluianu 2016). Regarding differences between varieties of Spanish, we found that the Latin American participants gave lower ratings to the construction Path verb … Manner element followed by the preposition *en*, such as *entró corriendo en la casa* 'she/he entered the house running' in comparison with the same construction with the preposition *a*, and lower than the participants from Spain did. This result suggests

that diatopical variation (Eslava Heredia 2012) is also a factor in choosing between the prepositions *en* and *a* in Spanish (cf. Ibarretxe-Antuñano 2003).

The last group of research questions was the following. Do the speakers of Spanish interpret sentences with main manner verbs as instances of boundary crossing? Is the boundary-crossing interpretation with directional manner verbs (*run*, *walk*) more likely than with pure manner verbs (*float*, *roll*)? Is the boundary-crossing interpretation with small Grounds (*la ardilla trepó en el pequeño hueco* 'the squirrel climbed upwards in(to) the small hole') more likely than with larger Grounds (… *en la casa del árbol* '… in(to) the treehouse')? Is the boundary-crossing interpretation more likely with vertical than with horizontal movements? The results of the interpretation task show that, when interpreting sentences with main manner verbs and choosing whether there was a boundary crossing or not, more than half of the participants of each variety indicated that the boundary-crossing reading was possible. The type of the manner verb (directional vs. pure; cf. Lewandowski and Mateu 2020), size of the Ground (cf. Beavers et al. 2010), and direction of the movement (vertical vs. horizontal; cf. Naigles et al. 1998) were not found to influence the probability of choosing the boundary-crossing interpretation in the present study, even with a relatively large number of participants, namely 180. This result differs from the results of the previous research that considers as an important factor the direction of the movement, with vertical crossings being more likely to be described with Manner verbs (Naigles et al. 1998). A possible reason for this discrepancy might be that the tasks used so far were focused on production and not interpretation. Importantly, the factor which did influence the participants' interpretation in Task 3 of the present study was again (as in the rating task) the preposition that followed the verbal construction: the probability of a boundary-crossing interpretation of sentences with main Manner verbs followed by the preposition *en* was again lower than that of those followed by the preposition *a*. So sentences such as *La ardilla trepó en la casa del árbol que construimos el año pasado* 'The squirrel climbed upwards in the treehouse that we built last year' were interpreted as a boundary crossing less often than sentences such as *La ardilla trepó a la casa del árbol que construimos el año pasado* 'The squirrel climbed upwards to the treehouse that we built last year'.

There was a correspondence between the open-ended descriptions of the videos depicting boundary-crossing events written by the participants from Chile in Task 1, who used manner verbs to describe *entering into* events reliably more often than to describe *exiting out of* events (participants with other varieties of Spanish exhibited a difference in the same direction but of a lesser magnitude and statistically the effect was not reliable), and the ratings of the suitability of the descriptions presented in Task 3, namely higher ratings of manner verbs, without a path element, with the preposition *a* (the *entering into* direction) than with the preposition *de* (the *exiting*

out of direction). However, no difference between *a* and *de* was found in Task 2 (asking about the participants' comprehension of sentences using manner verbs) for the probability of a boundary-crossing interpretation being chosen.

Section 2.1 reviews numerous research studies that took the Talmian typology (Talmy 1985, 1991, 2000) and the BCC for granted when making predictions about L2 acquisition success. This study shows that a complete assessment of the BCC in the language(s) concerned is needed before predictions about acquisition or interpretations of learner behaviour are made. Similarly, a better understanding of the BCC in different languages can have implications for pedagogical instruction, specifically for teaching the encoding of boundary-crossing events to L2 learners.

One of the limitations of this study is not taking into account other factors such as the intentionality of the events, i.e., if the Figure loses control of the movement or not in all tasks so that this could be included in the statistical models. However, this study used an innovative interpretation task which suggests that, even if speakers of verb-framed languages in previous studies did not use a main manner verb when describing boundary-crossing events, this does not mean that this construction might not be interpreted as a boundary crossing. Another limitation of the current study is that the data was collected online, which could potentially lead to more noise in the data. The online elicitation was one of the reasons why multiple tasks were included (besides the intention to test both production and comprehension, and test for factors that potentially modulate the BCC). The results for the different tasks corroborate each other well, which increases the reliability of the findings. These limitations, together with the variability between the participants, are worth pursuing in follow-up research.

In summary, this study provides a large-scale cross-dialectal investigation of motion verb use in Spanish, a verb-framed language. Data elicited from 180 native speakers from Spain and different Latin American countries assessed the production as well as comprehension of sentences describing events when a boundary between two spaces is crossed in order to test a putative constraint against the use of finite manner verbs in such contexts. The results clearly show that speakers of Spanish, at least in the countries well represented by the participants who were recruited (Spain, Mexico, Chile), do often use manner verbs to describe boundary-crossing events, especially when describing entering a space rather than exiting from one (a difference reliably confirmed for the participants from Chile). For the participants' evaluations of the suitability of sentences with different verbal constructions for describing boundary crossings, and for their choice between different interpretations of sentences with finite manner verbs, the results indicate the possibility of using manner verbs to express boundary crossings even more clearly, although it is modulated strongly by the preposition following the verb (*en* 'in' reducing the acceptability of manner verbs for boundary-crossing meanings; especially for the Latin Americans this preposition has the same effect even with the verbal construction previously regarded as typical in

verb-framed languages, namely a finite Path verb and a supplementary Manner element). Also, considering that the trends observed in the current data were surprisingly balanced across the varieties that were included, they provide robust evidence that in Spanish, classified as a verb-framed language, the boundary-crossing constraint is by no means absolute.

To conclude, the results demonstrate that in both comprehension and production, Spanish speakers do frequently connect manner verbs with boundary-crossing events. Furthermore, the use of manner verbs for describing boundary crossings is shown to depend on the preposition used. This finding supports the need to study motion-event encoding from a constructionist perspective which posits that the meaning is distributed over several elements rather than being located in a separate element. The results have significance in that they allow the reviewing of the Talmian typology of verb-framed versus satellite-framed languages (Talmy 1985, 1991, 2000), which has had a significant impact on research in Cognitive Linguistics, and they have potential applications in language acquisition research, foreign language teaching, and translation. The BCC has been taken as a fact, but the reality, at least for Spanish, seems to be more complex. This study offers an insight into that complex reality by providing empirical data about manner verb use in boundary-crossing contexts for Spanish; future studies will need to test the BCC for other verb-framed languages.

Data availability statement

The anonymised data is available at the Open Science Framework at the following link: https://osf.io/9tquh/.

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Appendix 1: Sentences used in the multiple-choice Task 2, each containing a main manner verb. The columns on the right provide the coding scheme

Sentence and English gloss	Ground size	Verb type	Movement direction	Preposition
La ardilla trepó al pequeño hueco del árbol. 'The squirrel climbed upwards to/into the small hole in the tree.'	Small	Directional	Vertical upward	*a*
La ardilla trepó en el pequeño hueco del árbol. 'The squirrel climbed upwards in/into the small hole in the tree.'	Small	Directional	Vertical upward	*en*
La ardilla trepó a la casa del árbol que construimos el año pasado. 'The squirrel climbed upwards to/into the treehouse that we built last year.'	Large	Directional	Vertical upward	*a*
La ardilla trepó en la casa del árbol que construimos el año pasado. 'The squirrel climbed upwards in/into the treehouse that we built last year.'	Large	Directional	Vertical upward	*en*
Escaló la vía ferrata al agujero. 'She/he climbed the via ferrata to/into the hole.'	Small	Directional	Vertical upward	*a*
Escaló la vía ferrata en el agujero. 'She/he climbed the via ferrata in/into the hole.'	Small	Directional	Vertical upward	*en*
Escaló la vía ferrata a la gran cueva. 'She/he climbed the via ferrata to/into the big cave.'	Large	Directional	Vertical upward	*a*
Escaló la vía ferrata en la gran cueva. 'She/he climbed the via ferrata in/into the big cave.'	Large	Directional	Vertical upward	*en*
En la actividad de barranquismo destrepé a una grieta del barranco. 'During the canyoning activity I climbed down to/into a gorge crack.'	Small	Directional	Vertical downward	*a*
En la actividad de barranquismo destrepé en una grieta del barranco. 'During the canyoning activity I climbed down in/into a gorge crack.'	Small	Directional	Vertical downward	*en*
En la actividad de barranquismo destrepé a una gran cueva. 'During the canyoning activity I climbed down to/into a big cave.'	Large	Directional	Vertical downward	*a*
En la actividad de barranquismo destrepé en una gran cueva. 'During the canyoning activity I climbed down in/into a big cave.'	Large	Directional	Vertical downward	*en*
El armadillo rodó por la rampa a la cestita. 'The armadillo rolled down the ramp to/into the little basket.'	Small	Pure	Horizontal	*a*

(continued)

Sentence and English gloss	Ground size	Verb type	Movement direction	Preposition
El armadillo rodó por la rampa en la cestita. 'The armadillo rolled down the ramp in/into the little basket.'	Small	Pure	Horizontal	*en*
El armadillo rodó por la rampa a la casa. 'The armadillo rolled down the ramp to/into the house.'	Large	Pure	Horizontal	*a*
El armadillo rodó por la rampa en la casa. 'The armadillo rolled down the ramp in/into the house.'	Large	Pure	Horizontal	*en*
María se tambaleó al coche. 'María staggered to/into the car.'	Small	Pure	Horizontal	*a*
María se tambaleó en el coche. 'María staggered in/into the car.'	Small	Pure	Horizontal	*en*
María se tambaleó a la cocina. 'María staggered to/into the kitchen.'	Large	Pure	Horizontal	*a*
María se tambaleó en la cocina. 'María staggered in/into the kitchen.'	Large	Pure	Horizontal	*en*
El búho voló de la pajarera hacia arriba. 'The owl flew up from/from inside the aviary.'	Large	Directional	Vertical upward	*de*
La pitón serpenteó del cubo. 'The python slithered from/out of the bucket.'	Small	Pure	Horizontal	*de*
Pedro escaló del refugio en la montaña. 'Pedro climbed up from/from inside the shelter on the mountain.'	Small	Directional	Vertical upward	*de*
El bebé gateó de la tienda de campaña. 'The baby crawled from/out of the tent.'	Small	Directional	Horizontal	*de*
Las nutrias dormidas flotaron del hueco del árbol. 'The sleeping otters floated from/out of the tree hole.'	Small	Pure	Horizontal	*de*
Las bailarinas bailaron del camerino. 'The ballerinas danced from/out of the dressing room.'	Large	Pure	Horizontal	*de*

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