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Path encoding and manner salience in motion event descriptions: the case of Bulgarian and English

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Abstract

Examining motion event descriptions allows us to evaluate what information individuals deem to be salient when communicating about events. Systematic variations between languages regarding how they encode details about motion events have given rise to theories of typological classifications of languages. In this study we evaluate the classification of Bulgarian, a South Slavic language, along Talmy's typology of verb-framed and satellite-framed languages, and relate this to Slobin's concept of manner salience. Based on behavioural evidence from an experiment using free-form descriptions in Bulgarian and English, we show that path encoding in Bulgarian is distinct from that of English (a satellite-framed language), but the use of complex path expressions in Bulgarian means it cannot be easily captured by Talmy's two-way classification system. We show that Bulgarian displays a lower rate of manner salience than English and patterns similarly to verb-framed languages in its treatment of the default manner of motion (walking).

Keywords: motion events; path encoding; manner salience; Bulgarian

Introduction

Motion events and motion event descriptions have been a popular subject of research in linguistics and cognitive science, providing a rich testbed for inquiry into language production, typology and motion event cognition. Talmy (2000)'s influential typology of path encoding has been the basis of much research in motion event descriptions. Talmy characterises motion events as consisting of four basic components: Figure, the object which is in motion; Ground, an object which serves as a reference point for the motion; Path, the path taken by the Figure with respect to the Ground; and Motion, the presence or absence of motion in the event. Additionally, the motion event can be associated with a Co-event which represents the Manner or Cause of motion. According to Talmy's proposal, languages are divided into two typological categories based on where they encode path information – verb-framed languages and satellite-framed languages. Verb-framed languages encode path in the main verb of a clause in constructions like “**enters** the room” (e.g. Spanish, French and Japanese). Satellite-framed languages encode path in a satellite to the verb, where satellite is a constituent which is in a sister relation to the main verb, or head of the clause, e.g. “walks **up** the stairs” and “enters the room **running**”

(e.g. English and Russian) (Talmy, 2000; Matsumoto, 2003; Beavers, Levin, & Wei Tham, 2010; Croft, Barðdal, Hollmann, Sotirova, & Taoka, 2010) .

A separate but related concept proposed by Slobin (2006) is that of manner salience: “the level of attention paid to manner in describing events” (Slobin, 2006). Slobin (2006) proposes different dimensions to manner salience. One of those is how rich of a vocabulary of manner expression a language has. Another is how often manner is expressed in descriptions of motion events. Slobin (2006) considers manner salience to be related to path encoding typology, since encoding the path in different parts of a description has consequences for what the available slots for manner are. Verbs are a required element of a clause, whereas satellites are not. Therefore, if the verb slot is occupied by path, manner is less likely to be mentioned as the satellite is not required and incurs extra cognitive costs. Conversely, if path is encoded in a satellite, the main verb slot is free and can be occupied by manner. English behaves along these lines – it is a prototypically satellite-framed language and has a high degree of manner salience. However, counterexamples to this relation have been demonstrated. Akita and Matsumoto (2020) study Japanese (a verb-framed language) and find a high degree of manner salience which is however not expressed through verbs, but through adverbials and ideophones (members of “an open lexical class of marked words that depict sensory imagery” (Dingemanse, 2019)). Berthele (2013) finds that not all satellite-framed languages exhibit high manner salience – in other words, having a free slot in the verb does not necessarily mean it will be used to express manner. We return to the question of the relationship between path encoding typology and manner salience in light of our experimental results.

In this paper we provide experimental evidence of how path and manner are expressed in a language which has not been extensively studied in terms of path encoding and manner salience – Bulgarian, a South Slavic language spoken primarily in Bulgaria. Slavic languages have previously been categorised as satellite-framed, likely because of more commonly studied members of the family which have been shown to behave as satellite-framed languages (e.g. Russian and Polish) (Talmy, 2000; Slobin, 2004; Kopecka, 2010). However,

previous work on Bulgarian has suggested that classification on the basis of genealogical belonging may be inaccurate, and that Bulgarian behaves like a verb-framed language instead (Croft et al., 2010; Dimitrova-Vulchanova, Martínez, Eshuis, & Listhaug, 2012; Speed, 2015). However, none of these studies use video materials showing human motion and instead use still images in the form of a picture book story (Berman & Slobin, 1994) or a non-human moving entity. This presents limitations on the clarity, variety and naturalness of the paths and manners represented (Akita & Matsumoto, 2020). One of the aims of this paper is to provide experimental evidence for Bulgarian's typological categorisation. Our experiment shows videos of human motions for a variety of manner and path combinations. In addition, no previous work has discussed manner salience in Bulgarian, and so we also aim to characterise the language in terms of its manner salience. Our experimental results provide a basis for discussion of the applicability of Talmy's typology to different languages of the world, as well as the connection between path encoding and manner salience.

As such, we pose the following research questions:

1. Does Bulgarian behave more like a satellite-framed language or like a verb-framed language? How does it compare to English?
2. Does Bulgarian show a higher or lower level of manner salience than English?

To answer these questions, we present results from an online experiment in which we asked participants to watch short video clips of motion events and describe these events in free text. We collected data in Bulgarian and English. English has been well characterised both in terms of Talmy's typology and manner salience. Therefore, we use it as a baseline for comparison, and a way to validate our experimental methodology and materials. In terms of typological belonging, we expect English to predominantly encode path in satellite constructions and Bulgarian in the main verb, based on previous work described above. For manner salience, we expect English speakers to mention manner more often than Bulgarian speakers, in line with Slobin (2006)'s predictions for satellite-framed and verb-framed languages.

Methods

Design

We conducted an online experiment in which we collected free written descriptions of motion events. Participants were asked to describe in their own words a series of short video clips representing a variety of motion events. The use of written description allows for comparison with previous work on Bulgarian (Dimitrova-Vulchanova et al., 2012). We chose to use video clips rather than still images or Frog stories to better illustrate the path and manner in each event, following Akita and Matsumoto (2020). We included a variety of paths and manners, since it has been reported that different

paths and manners may elicit different structures from speakers (Morita, 2020).

The stimuli included a combination of 6 paths (*to*, *towards*, *up*, *into*, *across* and *past*) and 3 manners (*walking*, *running* and *crawling*). This resulted in 18 path-manner combinations. The six paths represented both boundary-crossing and non-boundary crossing events, as well as the particularly salient path of vertical motion "up" (Aske, 1989; Slobin, 2006; Morita, 2020). The three manners included the default human manner of motion (walking), as well as two non-default manners (Akita & Matsumoto, 2020). We chose running as a particularly common non-default manner, as well as crawling which is less common, but can be easily described using a single lexical item in both Bulgarian and English (in Bulgarian "pulzya"/"lazya" (to crawl)).

Materials

The stimuli consisted of short video clips (a few seconds each), filmed with the help of three volunteer actors who performed each of the actions. The actors were instructed to perform each action, which was a combination of each manner and path. The paths were defined in relation to a ground element: "to a bike", "towards a chair", "into the room", "up the stairs", "past a table and chair" and "across the finish line". In addition to these real stimuli, we also filmed 15 filler items representing other actions such as "juggling", "marching along a corridor" and "throwing a ball". This resulted in 54 videos for the real stimuli and 45 videos for the filler items. All videos were filmed with a mobile phone camera.

Procedure

In the experiment, participants saw alternating real trials and filler trials to avoid having very similar events being shown in succession. The order of the real trials was randomised for each participant. Real trials were shown in three pre-set groups. Each group contained only one instance of each event (e.g. "walking into a room") and the groups were balanced to show an equal number of stimuli items from each of the three actors. The experiment was created using jsPsych v7.3.4.

Participants

Participant recruitment was through Prolific. We recruited 38 participants: 20 English speakers and 18 Bulgarian speakers. Participants were selected according to their self-reported first language on Prolific (Bulgarian or English respectively) and were paid £3 for their participation (£9 per hour).

Results

With the above procedure we obtained 360 descriptions in English and 324 descriptions in Bulgarian. The descriptions were then coded for the elements of interest separately for each of our questions (details below). It should be noted that descriptions which did not contain a path description were discarded, since we are only interested in descriptions of motion events with a path (as specified in our pre-registration for

Path	Language	Examples
Satellite	English	<i>walks into the room,</i> <i>runs crossing the finish line</i>
	Bulgarian	<i>ticha kum koleloto</i> (runs towards the bike)
Verb	English	<i>enters the room,</i> <i>approaches the stairs running</i>
	Bulgarian	<i>napuska stayata byagaiki</i> (leaves the room running)
Both	English	<i>enters into the room</i>
	Bulgarian	<i>vлиза v stayata pulzeiki</i> (enters (into) the room crawling)

Table 1: Sample sentences of each type of path encoding in English and Bulgarian

this experiment¹). Due to this, we discarded 48 English and 41 Bulgarian descriptions.

Analysis of path encoding

Coding procedure The descriptions were coded for the location of path into 3 categories: within the verb only, within the satellite only, and within both. This extends beyond the constructions specified by (Talmy, 2000). It has been shown that the original two categories cannot account for all constructions observed in languages of the world (Slobin, 2006; Beavers et al., 2010; Croft et al., 2010). Specifically, the verb-satellite complex construction has been attested in Bulgarian and we chose to include it in our analysis to account for the full variety of expression (Croft et al., 2010; Dimitrova-Vulchanova et al., 2012). We also use a wider definition of satellite than originally proposed by Talmy. He explicitly excludes prepositions from his definition, however, later work has shown this creates undesirable effects and constructions which cannot be classified (Matsumoto, 2003; Beavers et al., 2010; Croft et al., 2010). Therefore, we include prepositions in our definition of satellite. Examples of each category can be seen in Table 1.

Descriptions which contained more than one path were coded separately for each instance of path, e.g. “He approaches and runs up the stairs.” and “He walks into the room passing by a table and chair.”.

Results Figure 1 shows the percentage of each construction category occurring in our data for English and Bulgarian separately. We can see that English mainly expresses path in a satellite (93.5% of path descriptions expressed path in a satellite), with other path locations being much less common (verb – 4.8%, both – 1.7%). Bulgarian shows a more even split between expressing path in satellites (51.2%) and in the “both” category where path is expressed in a complex verb+satellite construction (41.3%). Contrary to our expectations, the verb category was not very common (7.6%).

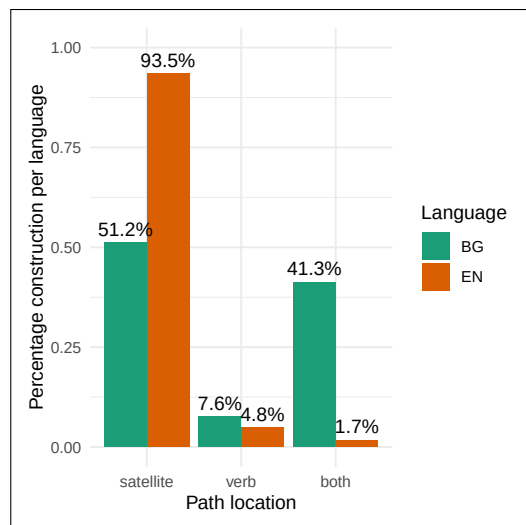


Figure 1: Percentage of each path location construction out of all path descriptions.

Statistical modeling For our statistical analysis we used the brms package (Bürkner, 2017) in R (R Core Team, 2024). brms is an R package for Bayesian modeling using Stan (Stan Development Team, 2023).

For the analysis of path location, we fitted a Bayesian categorical logistic regression model. The model dependent variable was path location, which had three levels for the three categories described above (*satellite*, *verb* and *both*) with “verb” as the reference category for the model. The predictor variable was language. We also had a random intercept for participant, as well as random slopes and intercepts for manner, path and actor. We used uninformative priors: the priors for the intercept were normal distributions with a mean of 0 and SD of 1.5; the priors for the fixed effects were normal distributions with a mean of 0 and SD of 1; the standard deviations were modeled as Cauchy distributions with a mean of 0 and SD 0.1; finally, the correlation matrix prior was LKJ(2).

The model estimates (Table 2) reveal the model has a fair amount of uncertainty, with quite wide 95% credible intervals. However, the directions of the effects are more certain: we see a mostly positive effect for “both” and “satellite” compared to “verb” in Bulgarian, a negative effect for “both” compared to “verb” in English compared to Bulgarian, and a mostly positive effect for “satellite” compared to “verb” in English compared to Bulgarian. This suggests that the two languages are likely to have different distributions over the possible categories, with Bulgarian tending to use more “both” expressions than “verb” expressions and that this difference is much less pronounced in English (reflecting the fact that English used much fewer “both” expressions than Bulgarian). The conditional posterior distributions are shown in Figure 2. In Bulgarian there might be a split between “satellite” and “both” categories, with both being preferred over “verb”. We can more confidently say that con-

¹<https://osf.io/rd5e9>

Path location	Coefficient	Estimate	Est. Error	l-95% CrI	u-95% CrI
both	Intercept	1.32	0.63	0.00	2.53
satellite	Intercept	1.59	1.06	-0.73	3.50
both	language - EN	-2.25	0.79	-3.56	-0.33
satellite	language - EN	1.09	0.79	-0.56	2.52

Table 2: Estimates from the categorical logistic regression model of path location in log-odds, with standard errors and 95% credible intervals. The reference category in the outcome variable is “verb,” and the reference level for language is Bulgarian.

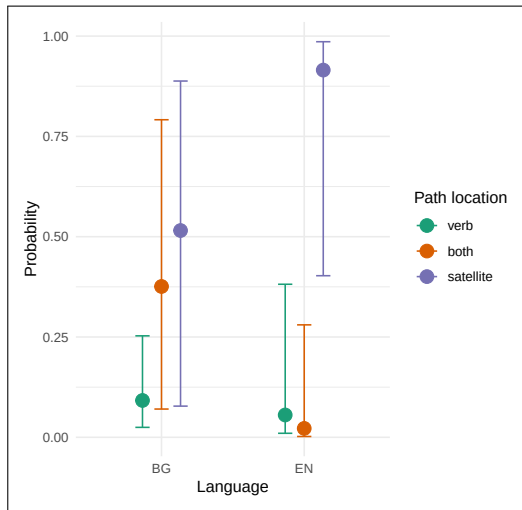


Figure 2: Conditional posterior distributions—that is, the estimated probability of belonging to each category—for each path encoding location in each language. Error bars represent the 95% Credible Interval.

trary to our prediction for Bulgarian, “verb” is unlikely to be the preferred category, as the upper point of its credible interval is only around 25%, with the other 75% remaining spread between “satellite” and “both”. For English, the “satellite” category seems to be preferred over “verb” and “both”, but we cannot say with certainty if the difference is large. This is in line with our prediction for English, but with some uncertainty. The model also reveals potential effects from the random variables for path type, manner type and participant. This suggests that the specific path and manner being depicted in the video can influence the encoding strategy chosen by the describer and there may also be a degree of individual variation between participants.

Analysis of manner salience

Coding procedure Manner was coded into a binary variable of present or not present. For the purposes of this coding, manner was considered to be the type of locomotion, i.e. walking, running or crawling, and their synonyms, e.g. striding or jogging, and descriptive phrases literally describing the type of locomotion, e.g. “on all fours”. Other types of manner (e.g. “slowly”) were not counted in this analysis. Table 1 contains examples of sentences in which no manner is mentioned (“enters the room”) as well as sentences which con-

tain the manner as we have defined it (English “walks into the room”; Bulgarian “napuska stayata byagaiki”, “leaves the room running”). We compare English and Bulgarian based on the frequency of manner expressions in each language.

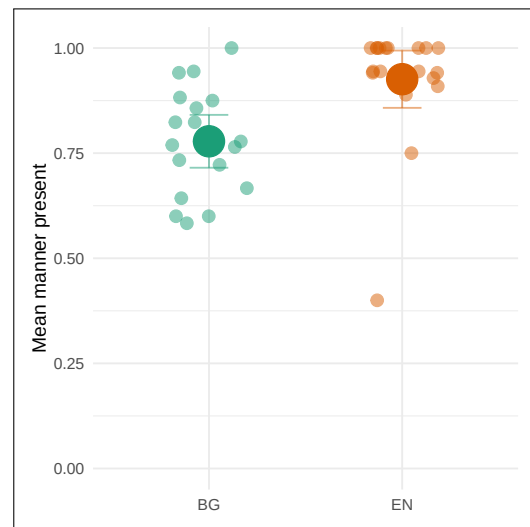


Figure 3: Percentage of manner present per language. Each smaller dot represents a participant and the big dots represent the mean percentage of manner for each language with 95% confidence intervals.

Results Figure 3 shows the percentage of manner expression per language with a spread over participants. On average, manner is mentioned more often in English than in Bulgarian. There is also more variation between participants in Bulgarian than in English. However, in both languages participants mention manner more often than not.

Statistical modeling We fitted a Bayesian logistic regression model to examine the effect of language on the presence of manner. The dependent variable was binary with the presence (1) or absence (0) of manner, and the predictor variable was language with levels for Bulgarian (reference level) and English. The model also had a random intercept for participant and random slopes and intercepts for manner, path and actor. We used the same uninformative priors as for the model for path encoding above.

Table 3 shows the coefficient estimates from the model. For Bulgarian, the estimate has a large credible interval around 0, so we cannot say for certain if the likelihood of

Coefficient	Estimate	Est.Error	l-95% CrI	u-95% CrI
Intercept	0.91	1.26	-1.90	3.07
language – EN	1.56	0.65	-0.06	2.60

Table 3: Estimates from the logistic regression model of manner presence in log-odds, with standard errors and 95% credible intervals.

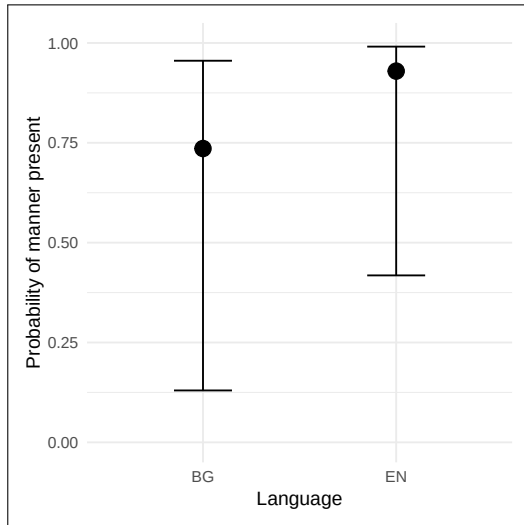


Figure 4: Conditional posterior distributions for the probability of manner being present in each language. Error bars represent the 95% Credible Interval.

mentioning manner is above chance. However, we see a mostly positive effect for language, meaning that there is likely a higher probability of mentioning manner in English than in Bulgarian. Figure 4 shows the estimates of the posterior probabilities once again representing the high level of uncertainty in the model, as well as the possible differences between languages. We also observe random effects from path type, manner type and participant. In particular, manner type may have a large effect on whether the manner is mentioned or not (we return to this as we provide some exploratory analyses of manner below). The random effect for participant suggests that some participants may individually be more or less likely to mention manner. Overall, it is likely that English speakers mention manner more often than Bulgarian speakers, however the absolute likelihood of manner being mentioned is uncertain.

Exploratory analysis: effects of path and manner type

Our results show potential effects of the specific path and manner depicted in the videos. Therefore, we take a closer look at the manner mentions for the different paths and manners in our materials. Figure 5 shows the percentage of manner being mentioned for each of the six paths used in the experiment. In Bulgarian we see a higher rate of manner being mentioned in the “towards” and “to” paths, compared to the other four. This difference might be explained by (Morita,

2020)’s idea of attraction of attention. “into”, “across” and “past” are boundary-crossing paths and “up” seems to be a particularly salient path as found by (Morita, 2020). It could be that the higher salience of path affects whether the speaker feels it is important to mention manner.

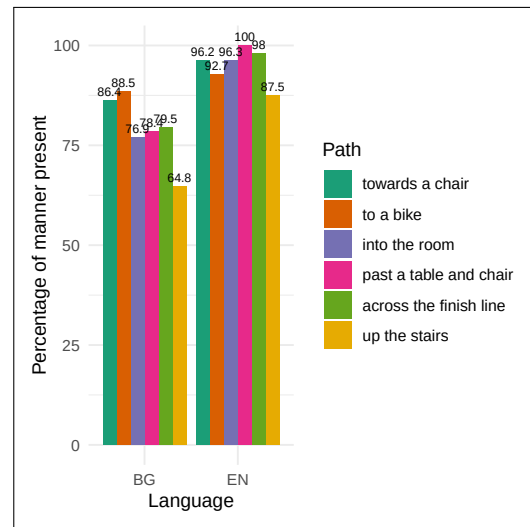


Figure 5: Percentage by manner present by path type for each language.

Next, we consider the effect of the particular manner. Figure 6 shows the percentage of manner being mentioned for each of the three manners used in the experiment. A striking result is that in Bulgarian “walking” is mentioned a lot less often than the other two manners and also a lot less often than in English. We return to this point in the Discussion.

Discussion

Path encoding

Our first research question was about the typological belonging of Bulgarian and English according to Talmy’s typology of path encoding. Our results show that English behaves as expected, with satellite-framed expressions being favoured over the other options. This also validates our experimental setup and materials. Contrary to our expectations, in our analysis for Bulgarian we do not see a tendency to employ pure verb-framed expressions. There also does not seem to be a predominant preference for satellite-framed constructions like in other Slavic languages, although this result is more tentative as our data shows a fair amount of variability. Instead, Bulgarian seems to employ a mix of satellite-framed constructions and constructions where path is expressed in

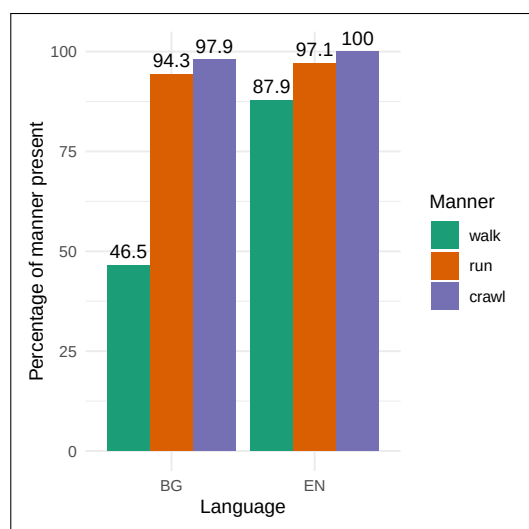


Figure 6: Percentage of manner present per manner type for each language.

both the verb and a satellite, with no clear preference for either. Therefore, our results support neither the genealogy-based classification, according to which Bulgarian as a Slavic language should be satellite-framed (Talmy, 2000; Slobin, 2006), nor Dimitrova-Vulchanova et al. (2012) and Speed (2015)'s proposals of Bulgarian as a verb-framed language. Thus our data provides no firm evidence that Bulgarian fits neatly into either of Talmy's language categories. It could be an instance of a split or parallel system in which there is no predominant preference for one structure (Talmy, 2000), or it could serve as evidence against Talmy's typology as a valid typology of languages (Beavers et al., 2010; Croft et al., 2010). Either way, further exploration of what determines the choice of construction is needed. Our results could also be validated using, for example, a corpus study to investigate the prevalence of path encoding constructions in naturally occurring text. Beyond determining a precise typological category, it would also be interesting to explore Bulgarian's structural tendencies in motion event descriptions in their geographical and historical context. As Speed (2015) notes, Bulgarian may be more similar to other Balkan languages (Turkish, Greek, Romanian) which are not Slavic and not satellite-framed. A comparative study with other Slavic languages in the region (e.g. Serbian) as well as a diachronic study of Bulgarian could give more insight into how the present system emerged.

Beyond the problem of not showing a predominant preference, our results pose a further challenge to Talmy's original classification, namely that a common strategy for expressing path is using a verb-satellite complex. This kind of construction is not acknowledged by Talmy, although it has been noted in other languages such as French (Croft et al., 2010). Croft et al. (2010) propose an extension to Talmy's typology to account for other constructions found in languages which do not neatly fit the original two-way distinction. One of their

new categories is double-framing, although from their examples it is not clear whether that refers to instances where there are two satellites or a verb and a satellite. Nonetheless, we propose that a category which includes such constructions is necessary to account for our data from Bulgarian.

Manner salience

Our second research question was about the degree of manner salience in Bulgarian and English. Our data show a relatively high degree of attention to manner in both languages and our analysis suggests that it is higher in English than in Bulgarian. Our results lend some support to Slobin (2006)'s idea that path typology is linked to manner salience. English patterns as expected, expressing path predominantly in satellites and having a very high rate of manner inclusion. Bulgarian, on the other hand, patterns more like verb-framed languages in that it expresses manner less often, especially when it comes to the default manner (walking).

However, the expression of manner seems to be affected by factors beyond language and typology. One such factor may be individual preference or sociolinguistic factors that we do not account for, e.g. educational background (as in Berthele, 2013). Our study also shows multiple highly similar videos to the same participant, allowing them to potentially develop a strategy for how to describe them, or potentially being influenced by priming effects from their own descriptions. It also seems like the presence of manner may depend on details of the scene being described, specifically which path and which manner are depicted. In particular, Bulgarian shows a lower rate of mentioning manner when it is the default manner of motion, namely walking (Akita & Matsumoto, 2020). This holds for Bulgarian descriptions of the other manners, and compared to English descriptions of events involving walking. This echoes findings from Japanese (Akita & Matsumoto, 2020), French (Morita, 2020) and Korean (Oh, 2003). This is interesting since these languages have all been classified as verb-framed. This further supports Bulgarian's mixed approach to motion event descriptions. The notion of defaultness in the expression of manner merits further exploration. Future work could examine more in depth whether walking is a special category of its own, or whether the tendency to omit walking is part of larger pragmatic effects of typicality which may extend to other manners depending on the discourse context. Another consideration for future work would be the communicative context – for example, the presence of an interlocutor or the purpose of description.

The Bulgarian descriptions in our data also show a remarkable difference in terms of variety of constructions used, compared to English. The majority of English descriptions expressed manner in the main verb and path as a satellite, following a similar blueprint. Meanwhile, Bulgarian descriptions expressed manner in the main verb, in adverbs accompanying the main verb, or in a separate clause in the same sentence. Further investigation of the location of manner can shed more light on the differences in manner expression between Bulgarian and English beyond simple frequency.

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