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Speed and space: semantic asymmetries in motion descriptions in Estonian

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Abstract: In this study, we investigate the expression of speed—one of the principal dimensions of manner—in relation to the expression of space in Estonian, a satellite-framed and morphology-rich language. Our multivariate and extensive corpus analysis is informed by asymmetries attested in languages with regard to expressing space (the *goal-over-source* bias) and speed (the *fast-over-slow* bias) where we attempt to explicitly link the two. We demonstrate moderate speed effects in the data in that fast motion verbs tend to combine with Goal, and slow motion verbs with Location and Trajectory expressions, making verbs of fast motion similar to goal verbs in their clausal behaviour. We also show that semantic congruency (i.e., expressing semantic information repeatedly in motion clauses) overrides the *goal-over-source* bias. That is, although verbs also occur in diverse patterns, they often combine with semantic units that mirror their meaning: goal verbs tend to combine with Goal, source verbs with Source, and manner verbs with Manner expressions. Such semantic congruency might serve as a tool for construal and, thus, is an important issue for future research.

Keywords: corpus study; Estonian; motion verbs; multivariate analysis; space; speed

1 Introduction

One of the fundamental aspects of any motion in space is speed—that is, how fast or how slowly a given motion is performed. As such, speed is highly important to human beings and essential to human motricity and sensory perception. Any motion can be described in terms of speed, which, in turn, is a relative characteristic incorporating notions of space and time. Thus, in our everyday life, it is essential and easy to distinguish between motions of different speed. For instance,

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we can easily tell if a car moves faster than a pedestrian. We also know that a moving car may be a source of danger, whereas a moving pedestrian is usually harmless. These basic aspects of motion have been further analysed in various studies in the field of cognitive psychology that show that the speed of motion influences how visually observable motion is processed (Burr et al. 1998; Hutchinson and Ledgeway 2010; Kreegipuu and Allik 2007; Tynan and Sekuler 1982). For example, reaction times in response to fast motion tend to be shorter compared to those of slow motion, and this can be explained by the need to react faster to presumably dangerous situations.

These basic observations and behavioural differences clearly relate to language. Psychological (Bargh et al. 1996; Loftus and Palmer 1974) and psycholinguistic studies (Kamide et al. 2016; Lindsay et al. 2013; Matlock 2004; Richardson and Matlock 2007; Speed and Vigliocco 2014; Speed et al. 2017) provide evidence that speed information encoded in motion descriptions associates with the visual processing of a scene. For instance, when fast motion is expressed, participants tend to focus on the endpoints of motion more quickly as compared to slow motion (Lindsay et al. 2013; Speed and Vigliocco 2014). The importance of speed has also been observed in other linguistic studies of motion, which suggest that speed is one of the core subcategories of manner as it is “particularly relevant to movement” (Ikegami 1969: 61) and a “pervasive underlying dimension” of motion (Slobin et al. 2014: 728). The importance of speed as a category is reflected in that it occurs in all major manner classifications regarding both motion verbs and manner modifiers (e.g., Cardini 2008; Kopecka 2010; Narasimhan 2003; Snell-Hornby 1983; Stosic 2019).

However, despite extensive research on motion events within individual languages as well as across typologically varied languages (Goschler and Stefanowitsch 2013; Hasko and Perelmutter 2010; Hickmann and Robert 2006; Ibarretxe-Antuñano 2017; Matsumoto and Kawachi 2020; Talmy 2000b), the linguistic expression of speed as a subcategory of manner has received relatively little attention, and we still lack a systematic and typologically-informed account of how speed is expressed in different languages. Adding to the recently growing body of research on fine-grained and essential aspects of motion events, the current large-scale corpus study aims to examine the characteristics of motion descriptions from the perspective of motion verbs that differ from each other in the speed of motion they express.

Through this, we also aim to investigate the relationship between two types of asymmetries observed in the expression of motion events in various languages: the *goal-over-source* (e.g., Bourdin 1997; Dirven and Verspoor 1998; Ikegami 1987) and *fast-over-slow* asymmetries (Ikegami 1969; Plungian and Rakhilina 2013; Taremaa and Kopecka 2022a). To do this, we need to establish the semantic and

morphosyntactic characteristics of motion descriptions in relation to verbs differing in their expression of speed. To reach our goal, we investigated the Estonian language, which is a morphology-rich, satellite-framed language that (i) also routinely employs the verb-framed strategy (Nelis and Miljan 2016; Taremaa 2017; for lexicalisation patterns and framing strategies, see Talmy 1985, 2000b), (ii) shows a general tendency for the *goal-over-source* bias while also having considerable deviance from it (Pajusalu et al. 2013; Taremaa 2017), and (iii) tends to express fast motion more frequently and diversely than slow motion (Taremaa and Kopecka 2022a). Based on multivariate analyses of the corpus data, we demonstrate that motion verbs of fast motion behave differently from verbs of slow motion. Furthermore, we show some evidence for the *goal-over-source* bias, but primarily, we provide evidence for semantic congruency as the main mechanism driving the predominant clausal patterns.

The structure of the paper is as follows. Section 2 addresses previous research on factors that contribute to structure of motion descriptions with a specific focus on speed as the subcategory of manner. Section 3 provides a brief description of the Estonian language. Section 4 outlines the hypotheses of the study. Section 5 presents the corpus on which the present study is based, coding decisions, and the statistical techniques used to analyse the data. Section 6 gives an overview of the data and presents the results of the corpus analyses by means of multivariate analyses of verbs and their associations with other clausal units. Section 6 also gives an overview of the most characteristic clausal patterns across verb groups with different semantics. Finally, Section 7 discusses the results in the light of asymmetries attested in language by also addressing the role of congruency in conceptualisation.

2 Background

Three aspects of motion events call for a closer look before we frame the hypotheses of our study: (i) Talmy's lexicalisation patterns and factors that associate with the typological profile of a language, (ii) the manifestation of the *goal-over-source* bias in languages and the factors that influence this realisation, and (iii) the effects of the *fast-over-slow* bias on the structural choices of motion descriptions.

Firstly, we discuss the typological framework of motion events. According to Talmy (2000b: 25), “the basic Motion event consists of one object (the Figure) moving or located with respect to another object (the reference object or Ground)”,¹ and in case of motion, it refers to translational motion in that “the location of the

¹ Highlighting in bold of the original quote removed.

Figure changes”. An essential component of motion events is Path defined as “the path followed or site occupied by the Figure object with respect to the Ground object” (Talmy 2000b: 25). Talmy (1985, 2000b) suggests that languages rely on several lexicalisation strategies when expressing motion events. Importantly, based on the expression of Path—i.e., whether the Path is expressed in the verb (e.g., *she exited*) or in a morpheme associated with the verb (e.g., *she ran out*)—he divides most languages into two major types: verb-framed and satellite-framed languages. Languages that tend to encode the Path in the verb are verb-framed languages (e.g., Spanish and Italian). Languages that tend to encode the Path outside the verb in a so-called satellite—e.g., verb particles or verb affixes—are satellite-framed languages (e.g., English and German). Although languages can have both strategies available, they are typically biased towards being either verb-framed or satellite-framed even if the preferred strategy may be applied to varying degrees; even so, much intra- and inter-language variation occurs (Filipović 2007; Goschler and Stefanowitsch 2013; Ibarretxe-Antuñano 2009, 2017; Kopecka 2006; Matsumoto and Kawachi 2020; Talmy 2000b; Zlatev and Yangklang 2004). For example, Standard High German uses a satellite-framed strategy (in terms of verb choice) much more extensively than its Swiss varieties (Berthele 2013), and Russian uses a satellite-framed strategy more extensively than its kindred language, Polish, even though both are considered satellite-framed languages (Łozinska 2018).

Expanding on the lexicalisation patterns of these varieties of verb-framed and satellite-framed languages, cross-linguistic analyses have led to an understanding that languages differ along the cline of **manner salience** and the cline of **path salience** (Ibarretxe-Antuñano 2009; Ibarretxe-Antuñano and Hijazo-Gascón 2012; Slobin 2004, 2006). Manner salience captures the degree to which speakers of a language pay attention to manner and express it in discourse. The degree of manner salience has been attributed to the size, diversity and accessibility of the manner verb lexicon and to the morphosyntactic structure of a language (Slobin 2006). Satellite-framed languages tend to be manner salient languages, while verb-framed languages tend not to be (Slobin 1996, 2004, 2006). Path salience shows the degree to which a language details path information when expressing motion. Furthermore, path salience is not directly linked to the distinction between satellite-framed and verb-framed languages. This is because path salience in a language is measured not by means of the use of path verbs but by the ability of motion verbs to combine with spatial expressions other than “satellites” (Ibarretxe-Antuñano 2009; Ibarretxe-Antuñano and Hijazo-Gascón 2012). The degree of path salience has been shown to relate to a number of factors, such as the size and diversity of the inventory of spatial morphosyntactic devices, word order, and commonality of redundancy, although not all of them necessarily play the same

role, if any, or to the same extent, in all languages (Ibarretxe-Antuñano and Hijazo-Gascón 2012: 355–356).

Secondly, path salience can be linked to the **goal-over-source bias**—although this relationship has not been examined thoroughly thus far—which captures a tendency to express Goal (the destination of motion) most frequently and saliently. This tendency, suggested first by Ikegami (1987), and further elaborated by Bourdin (1997) and Dirven and Verspoor (1998), has been attested in many languages (e.g., Georgakopoulos 2018; Johanson et al. 2019; Kabata 2013; Lakusta and Landau 2005; Verkerk 2017). At the same time, evidence suggests that there is much variation in how languages behave differently with respect to the *goal-over-source* bias as not all languages and/or contexts are equally goal-biased (Kopecka and Ishibashi 2011; Kopecka and Vuillermet 2021). Moreover, recent research suggests that satellite-framed languages may be more biased towards the Goal than verb-framed languages (Georgakopoulos et al. 2019).

In addition, the expression of Goal is dependent on language-internal factors. The semantics of the verbs in terms of predominantly lexicalising either manner or path (resulting in manner verbs vs. path verbs, respectively) is one of the main verb-related factors that is relevant to the *goal-over-source* bias. In particular, manner verbs are more likely to combine with expressions of Location (the place where motion is conducted) or Trajectory² (the route followed by the mover), whereas path verbs are more likely to combine with expressions of Source (the starting point of motion) or Goal (the destination of motion) (Nikitina 2009; Rohde 2001; Stefanowitsch and Rohde 2004). Furthermore, path verbs that profile the final portion of the path (i.e., goal verbs) tend to co-occur with Goal expressions, but those that profile the starting point of motion (i.e., source verbs) tend to co-occur with Source expressions (Rohde 2001; Stefanowitsch and Rohde 2004; Taremaa 2017).

Furthermore, different manner verbs can be Goal-oriented to different degrees, suggesting the relevance of salient manner features. For example, Taylor (1996), in his analysis of the verbs *run* and *jog*, suggests (among other semantic aspects) that whereas running is rather fast and goal-oriented in that “you run to a place because you need to get there quickly” (Taylor 1996: 27), jogging is not an activity one conducts “in order to arrive at some destination” (Taylor 1996: 26). This, in turn, has consequences for the expression of Goal in that *run* may be more prone to combine with Goal expressions than *jog*. Furthermore, verbs of vertical motion (particularly those expressing downward motion) are more likely to co-occur with Goal than verbs of horizontal motion (Taremaa 2021a). Apart from verb semantics,

2 The term ‘Trajectory’ is not to be confused with the Talmy’s term ‘Path’. Trajectory specifies Ground and refers to the route of motion (also known as medium, median, intermediary, etc.).

the *goal-over-source* bias has been mainly associated with animate movers (Dirven and Verspoor 1998; Ikegami 1987; Lakusta and Landau 2005; Stefanowitsch and Rohde 2004). It has also been shown that discourse factors such as the knownness of a spatial entity may influence the expression of Source, but these do not influence the expression of Goal (Do et al. 2020).

Finally, the focus of the current paper, **speed**, is the core category of manner. Therefore, its expression is closely related to manner salience, whereas its relation to path salience and the *goal-over-source* bias is less obvious. In general, there is converging evidence for yet another substantial underlying asymmetry in languages in expressing motion. Labelled the ***fast-over-slow bias*** (Taremaa and Kopecka 2022a), fast motion tends to be expressed more frequently and in a more fine-grained and intensified fashion than slow motion (Hallonsten Halling 2018; Ikegami 1969; Plungian and Rakhilina 2013; Taremaa and Kopecka 2022a). The study of Taremaa and Kopecka (2022a) on the Estonian language shows that speed modifiers of fast motion (e.g., *kiiresti* ‘fast’) are roughly five times as frequent as modifiers of slow motion (e.g., *aeglaselt* ‘slowly’), and their inventory is also larger and more diverse than that of slow motion. A similar observation has been made by Ikegami (1969), who notes that in English, the inventory of fast motion adjectives is larger than that of slow motion (for a similar observation for the Slavic languages, see Plungian and Rakhilina 2013). Furthermore, we have shown earlier (Taremaa and Kopecka 2022a) that in Estonian, fast motion is often described by means of congruent patterns in which both the verb and the modifier convey fast motion (e.g., *kiirustas ruttu koju* ‘(s)he hurried home fast’), whereas verbs of slow motion are much more flexible. Besides congruent patterns, they also exhibit non-congruent patterns in terms of speed (cf. *lonkis aeglaselt koju* ‘(s)he strolled home slowly’ and *lonkis kiiresti koju* ‘(s) strolled home fast’). Thus, such asymmetries between expressions of fast versus slow motion manifest themselves in the use of speed modifiers and in verb and modifier combinations.

3 The Estonian language

Estonian is a satellite-framed and manner-salient Finno-Ugric language (Nelis and Miljan 2016; Taremaa 2017; Taremaa et al. to appear; see also Talmy 2000b). As a typical satellite-framed and manner-salient language, Estonian routinely uses its large inventory of manner verbs in the main clause of a sentence to describe motion events. Its morphological richness and complexity are likely to provide the means to express manner and spatial information diversely and in a fine-grained way. Estonian has in its repertoire: (i) 14 cases that attach to nominals as suffixes (seven of which express spatial information); (ii) a rich set of adpositions (both

prepositions and postpositions) and adverbs (including those that serve as verbal particles; i.e., satellites); (iii) a relatively free word order; and (iv) the flexibility to compose long, complex, and loaded (noun) phrases and sentences (for further details, see Erelt 2003; Rätsep 1978; Tauli 1973, 1983). As for spatial language, spatial cases and many spatial adpositions and adverbs have a three-tier system of marking source, location, and goal (e.g., ablative, adessive, and allative as *on-*cases or *seest* ‘from inside’, *sees* ‘inside’, and *sisse* ‘into’ as postpositions).

These language-specific characteristics in relation to motion are exemplified in (1) and (2). The main verb conveys manner (*välja purjetama* ‘sail out’ in (1) and *üles tormama* ‘rush up’ (2)), while directional information is provided by the verbal particles *välja* ‘out’ (1) and *üles* ‘up’ (2). Furthermore, in (1), the expressions of Source (*Vahemerelt* ‘from the Mediterranean Sea’), Trajectory (*läbi Gibraltari väina* ‘through the Strait of Gibraltar’), and Goal (*Atlandi ookeanile* ‘to the Atlantic Ocean’) occur, illustrating case-inflected spatial phrases (Source and Goal) and prepositional phrases (Trajectory).³ In (2), Trajectory is expressed by a case-inflected phrase (*trepist* ‘along the stairs’) alongside Manner, which is expressed by a gerund form (*hõlmade lehvides* ‘with jacket fronts fluttering’) and an adverb phrase (*hoolimatult* ‘carelessly’).

- (1) *kes purjeta-si-d Vahemere-lt välja Atlandi ookeani-le*
 who.NOM sail-PST-3PL Mediterranean.Sea-ABL out Atlantic.GEN ocean-ALL
läbi Gibraltari väina
 through Gibraltar.GEN strait.GEN
 ‘who sailed out of the Mediterranean to the Atlantic Ocean through the Strait of Gibraltar’

- (2) *Keegi torna-s lahtis-te hõlma-de lehvi-des*
 someone.NOM rush-PST.3SG open-PL.GEN jacket.front-PL.GEN flutter-GER
hoolimatult trepi-st üles.
 carelessly stairs-ELA up
 ‘Someone rushed up the stairs carelessly with their jacket fronts fluttering.’

Furthermore, Estonian, in general, shows the *goal-over-source* bias in motion descriptions (Pajusalu et al. 2013). However, much intra-language variation occurs in that not all motion verbs have a tendency to combine with Goal expressions (Taremaa 2017). There is also evidence that fast motion is expressed more frequently in discourse and by a greater diversity of means as compared to slow motion in Estonian (Taremaa and Kopecka 2022a).

³ All examples presented in this paper come from the corpus material on which the study is based (see Section 5).

4 Aim and hypotheses

The aim of this study is to reveal whether there are clausal differences in expressing fast versus slow motion, considering that Estonian is a satellite-framed language of rich morphology that exhibits *goal-over-source* and *fast-over-slow* tendencies. We hypothesise that verbs of slow motion, as compared to verbs of fast motion, have distinct behaviour in terms of their typical clausal patterns. We use the term “clausal patterns” due to its generality and define it as frequent combinations of verbs and other semantic (and morphosyntactic) clausal units. As such, clausal patterns can also be viewed as constructions (Goldberg 1995) or constructional profiles (Janda and Solovyev 2009).

More precisely, given the language-specific and typological characteristics of the Estonian language, we hypothesise the following:

H1. Verbs of fast motion are more likely to combine with Goal expressions than verbs of slow motion. This is driven by the idea that fast motion is more likely to be chosen in contexts of reaching a goal and that fast motion expressions tend to draw one’s attention to the goal of motion rather than its source or trajectory (Lindsay et al. 2013; Speed and Vigliocco 2014).

H2. Goal is predominantly expressed, and particularly so together with goal verbs and fast motion verbs in descriptions of animate motion. The rationale for this hypothesis is based on the suggestion that the *goal-over-source* bias is particularly relevant to animate motion (Dirven and Verspoor 1998; Ikegami 1987), and on the observations that Goal is frequently expressed in combination with goal verbs (e.g., Nikitina 2009; Stefanowitsch and Rohde 2004) and is closely related to fast motion (Lindsay et al. 2013; Speed and Vigliocco 2014).

H3. Extensively elaborated speed information results in the backgrounding of other spatial aspects of an event to enhance this specific meaning of speed, and this applies particularly to fast motion. This hypothesis is based on the findings that fast motion expression tends to be more elaborated and diverse than the expression of slow motion (e.g., Plungian and Rakhilina 2013; Taremaa and Kopecka 2022a). In turn, intensification by means of multiple expressions of speed is achieved at the cost of backgrounding spatial information.

To test these hypotheses, we will compare the semantic structure of motion clauses that differ from each other by the speed of motion the verb describes. As an interacting parameter of verb semantics, the type of motion verb (manner vs. path verbs) is included in the analysis. A detailed overview of the variables and data is presented in the following section.

5 Data and method

To address the role that speed information plays in motion descriptions, we conducted a corpus study of written Estonian. Corpus data was taken from the

Estonian National Corpus 2019 (Koppel and Kallas 2020) of written language⁴ using 41 frequent motion verbs of translational horizontal motion. Verb choice was based on the earlier studies of motion descriptions in Estonian (Taremaa 2017, 2021b). The verbs chosen are the most frequent motion verbs in Estonian (Taremaa 2017), and these verbs have also been determined through a sorting experiment to clearly express horizontal and translational motion (Taremaa 2021b; see Taremaa and Kopecka 2022a for concise details regarding the verb choice). For each of the 41 verbs, 300 clauses were randomly selected from the corpus with motion verbs in finite form being used in their literal sense of describing physical motion.⁵ Altogether, the data consists of 12,300 clauses describing actual, self-propelled motion.

Clauses were manually inspected for their meaning and then coded for the variables, as presented in Table 1. The variables specify the semantics of the verbs and the presence of semantic dimensions that can occur in motion clauses. As for verb semantics, VerbType captures the type of verb in terms of expressing path or

Table 1: Coding schema.

	Variables	Values	Explanations
Verb-related variables	Verb	<i>astuma</i> ‘step’, <i>jookma</i> ‘run’, etc.	Individual lemmas
	VerbSpeed	Numeric value ranging from –1.34 (slow) to 1.68 (fast)	Standardised speed ratings indicating the speed of motion lexicalised in the verb (taken from Taremaa 2017)
	VerbSpeedCat	fastVerb, medium-Verb, slowVerb	Speed ratings grouped into three categories through K-means clustering
	VerbType	MannerVerb, Goal-Verb, SourceVerb	Semantics of the verbs in terms of expressing path (i.e., source or goal) or manner
	VerbCat	fMV, mMV, sMV, mSV, mGV	A combined variable of verb semantics indicating both VerbSpeedCat and VerbType (see explanation and Table 2 below); fMV = manner verb of fast motion, mMV = manner verb of medium speed, sMV = manner verb of slow

⁴ The Estonian National Corpus 2019 contains 1.5 billion words. It consists of texts of written language from a diverse array of genres (e.g., fiction, newspaper, various web texts, etc.).

⁵ In case of coordinated sentences, only the clause containing the search verb was considered.

Table 1: (continued)

	Variables	Values	Explanations
Variables specifying spatial circumstances of motion	Source	yes, no	motion, mSV = source verb (of medium speed), mGV = goal verb (of medium speed) The presence of a Source expression in a clause (the starting point of motion)
	Location	Yes, no	The presence of a Location expression in a clause (the place where motion is conducted)
	Trajectory	Yes, no	The presence of a Trajectory expression in a clause (the route taken when moving from one point to another)
	Direction	Yes, no	The presence of a Direction expression in a clause (the place towards which motion is conducted or the general direction of motion)
	Goal	Yes, no	The presence of a Goal expression in a clause (the endpoint of motion)
	Distance	Yes, no	The presence of a Distance expression in a clause (the length of the route covered by motion)
Variables specifying other relevant aspects of motion	Purpose	Yes, no	The presence of a Purpose expression in a clause (the aim of the mover)
	Result	Yes, no	The presence of a Result expression in a clause (the final state of the mover)
	Time	Yes, no	The presence of a Time expression in a clause (the time when motion begins, takes place, or ends)
	MoverAnimacy	Animate, inanimate, vehicle, unclear	Animacy of the mover
	Manner	Yes, no	The presence of a broadly defined Manner expression in a clause (the way motion is conducted; see also Taremaa and Kopecka 2022a)
	Speed	Yes, no	The presence of a Manner expression that depicts the speed of motion
	SlowOrFast	fastModif, slow-Modif, variableModif, noSpeedModif	The semantics of a Speed expression (if present) in terms of expressing fast, slow, or variable motion

manner. VerbSpeed captures the speed of motion expressed by the verb. VerbSpeed was based on the results of an earlier experiment where the speed of the verbs was measured by means of a rating study in which the participants rated on a continuous scale each verb for the speed it expresses (Taremaa 2017; see also Taremaa and Kopecka 2022a). Thus, the verbs of the current study vary as to the speed of motion they express, ranging from low speed verbs to high speed verbs. In addition, based on the speed ratings of the verbs, they were clustered into three groups (VerbSpeedCat). A combined variable—VerbCat—is derived from VerbType and VerbSpeedCat (see explanation and Table 2 below).

Table 2: Motion verbs of the study categorised based on VerbType and VerbSpeedCat.

	Manner verbs	Source verbs	Goal verbs
Fast motion verbs	1_kihutana ‘race, career’	–	–
	2_tormama ‘rush, dash’		
	3_kiirustama ‘hurry, rush’		
	4_ruttama ‘hurry, rush’		
	5_jooksma ‘run’		
	6_lippama ‘scamper’		
	7_töttama ‘hurry’		
	8_lipsama ‘slip, sneak’		
	9_sibama ‘scurry’		
	10_sõitma ‘drive’		
	11_ratsutama ‘ride, gallop’		
Medium motion verbs	12_suusatama ‘ski’	20_väljuma ‘exit’	18_tulema ‘come’
	13_väntama ‘pedal’	24_lahkuma ‘leave’	19_minema ‘go’
	14_marssima ‘march’	30_eemalduma	22_saabuma ‘arrive’
	15_purjetama ‘sail’	‘distance oneself’	23_lähenema
	16_trügima ‘push, scramble’		‘approach’
	17_ujuma ‘swim’		25_suunduma ‘head’
	21_kõndima ‘walk’		26_sisenema ‘enter’
	27_astuma ‘step, tread’		31_naasma ‘return’
	28_sammuma ‘walk, step’		
	29_sõudma ‘row’		
Slow motion verbs	32_kolama ‘loaf, loiter’	–	–
	33_hulkuma ‘wander’		
	34_tatsama ‘toddle’		
	35_jalutama ‘walk, stroll’		
	36_uitama ‘stroll’		
	37_lonkama ‘limp’		
	38_hiilima ‘sneak’		
	39_roomama ‘crawl’		
	40_komberdama		
	‘stumble, hobble’		
	41_lonkima ‘stroll, saunter’		

As for the clausal units other than the verbs, they include the following spatial categories (see Table 1): Source as the starting point of motion (e.g., *metsast* ‘from the forest’), Location as the place of motion (e.g., *metsas* ‘in the forest’), Trajectory as the route along which motion is conducted (e.g., *mööda teed* ‘along the road’), Direction as the general orientation of motion or motion towards a place not known to be reached (e.g., *maja poole* ‘towards the house’), Goal as the spatial destination of motion (e.g., *metsa* ‘into the forest’), and Distance as the length of the journey (e.g., *kaks kilomeetrit* ‘two kilometres’). In addition, there are other typical semantic categories, such as Manner, which details how motion is conducted (e.g., *jalgsi* ‘on foot’), Purpose as the aim of the mover (e.g., *läks sööma* ‘(s)he went to eat’), Result as the final condition of the mover (e.g., *hingetuks* ‘breathless’), and Time as the temporal characteristic of motion (e.g., *täna* ‘today’). All are binary variables with the values ‘yes’ (the expression occurs in a clause) and ‘no’ (the expression does not occur in a clause). In addition, as a variable overlapping with Manner, the presence of speed modifiers (e.g., *kiiresti* ‘fast’) was coded (Speed) along with their type in terms of speed (fast, slow, or variable motion: SlowOrFast). The clauses were also annotated for the animacy of the mover (i.e., MoverAnimacy).

Apart from VerbSpeed, which was automatically coded using the results of an earlier experiment (Taremaa 2017), all other variables were manually coded by a team of native speakers of Estonian. Ten percent of the data was double coded to ensure that the coding decisions were consistently made and applied. The discrepancies that occurred during the process of double coding were discussed on a regular basis and the coding was refined and adjusted accordingly (intercoder reliability was not calculated). The morphological coding of the data was automatically done using Stanza (Qi et al. 2020) and then manually checked and corrected. A detailed account of the coded variables alongside extensive examples is given in Supplementary Materials.

For the purpose of clearer data presentation, the verbs and corresponding clauses were further categorised into five broad groups based on the semantics of the verb in terms of VerbType and VerbSpeed (see Table 2). First, based on speed ratings (VerbSpeed), the verbs were clustered into three speed categories using K-means clustering where groups were established based on natural breaks (VerbSpeedCat). Then, the verbs were categorised based on their type (manner, goal, or source verbs) and speed (fast, medium, or slow motion verbs). Source and goal verbs only express medium speed (and thus, there are no respective fast and slow verbs).⁶ Manner of

⁶ One may wish to call the middle cluster verbs (particularly path verbs) speed-neutral verbs, but this would warrant a separate study to establish the speed-neutrality of certain motion verbs. Thus, in this study, we refer to the middle group as motion verbs of medium speed.

motion verbs, on the other hand, can range from lexicalising fast to slow motion (and thus, there are fast, medium, and slow manner verbs). In the table, the numbers preceding the verbs indicate their relative speed, with 1 indicating the fastest motion and 41 the slowest motion, as established in Taremaa (2017).

Statistical tools. Because our data is multivariate (a large number of variables are measured simultaneously) and highly complex (the variables interact with each other in a number of ways), we utilise a mixture of methods each of which helps us to reveal different facets of the internal structure of the data. This enables us to establish significant interrelations and typical clausal patterns with respect to the speed of motion as expressed in motion clauses. More specifically, we apply multiple correspondence analysis as an exploratory technique and conditional inference trees as a hypothesis-testing technique. Multiple correspondence analysis enables us to compare the use of individual verbs (which, in turn, vary in semantics) in relation to most significant variables (see Table 1).

By means of conditional inference trees, we directly address our hypotheses (H1 and H2) and detect predominant clausal patterns (see Section 4 above). We model two verb-related variables—VerbSpeed and VerbCat—as response variables, and variables specifying the semantic structure of clauses in terms of space and other relevant dimensions of motion as explanatory variables (i.e., Source, Location, Trajectory, Direction, Goal, Distance, Result, Time, Purpose, MoverAnimacy, Manner, SlowOrFast). To assess the performance of the models, we calculated Pearson's R^2 for VerbSpeed as a continuous response variable, and prediction accuracy measure for VerbCat as a categorical response variable.

Finally, and to address our third hypothesis (H3) regarding the backgrounding of spatial aspects when speed information is foregrounded, the analyses are complemented with statistical testing using the Chi-square test alongside Cramér's V that measures the strength of the association. More specifically, we compare the clauses with and without speed modifiers (Speed+ and Speed-) with each other in terms of whether space is specified or not in these two sets of clauses, and if it is, whether the two sets of clauses differ in their frequencies of Source, Location, Trajectory, Direction, Goal, and Distance being expressed.

All calculations were performed in R using the following packages: 'stats' (R Core Team 2020), 'party' (Hothorn et al. 2015), 'sjplot' (Lüdtke 2021), 'factoextra' (Alboukadel and Mundt 2020) and 'FactoMineR' (Le et al. 2008). The data and reproducible R code are available in the data repository DataDOI⁷ (Taremaa and Kopecka 2022b).

7 <https://doi.org/10.23673/re-364>.

6 Results

According to our principal hypothesis, there should be differences in the expression of fast versus slow motion, which in turn should be influenced by factors related to (i) the dominant lexicalisation pattern of the language; (ii) the *goal-over-source* bias; and (iii) the *fast-over-slow* bias. Thus, to reveal any possible differences between expressing fast versus slow motion, we will compare clausal patterns of the Estonian motion verbs that differ from each other according to the speed of motion they lexicalise. By doing so, we consider (i) verb semantics in terms of expressing manner, source, or goal; (ii) the type of mover; and (iii) speed of motion as expressed by manner modifiers. Before proceeding to the results, we will first give a general overview of the distributions in the data which is necessary to place the results in context.

6.1 Overview of the data

Table 3 shows the distribution and forms of the semantic units in clauses (other than the verbs). Knowing this information is a prerequisite for interpreting the results presented in the following sections. Regarding spatial categories, the final portion of the path (i.e., Goal and Direction) is most frequently expressed in clauses, followed by Trajectory and Location. Source is expressed much less

Table 3: The distribution and forms of the semantic units in clauses (other than the verbs) in the corpus data of 12,300 clauses.

	Category	% of clauses expressing the category (N)	Three main morphosynt. devices (N of clauses)
Variables specifying spatial circumstances of motion	Goal	33.4% (4,109)	NP _{ILL} (2,059), NP _{ALL} (731), AdpP (663)
	Direction	19.3% (2,378)	AdvP (1,571), AdpP (399), NP _{ALL} (203)
	Trajectory	18.2% (2,241)	AdpP (844), AdvP (806), NP _{ELA} (211)
	Location	16.7% (2,049)	NP _{INE} (757), NP _{ADE} (476), AdvP (315)
	Source	11.6% (1,421)	NP _{ELA} (883), NP _{ABL} (202), AdvP (193)
	Distance	2.2% (268)	QuantP (168), NP _{GEN} (37), NP _{NOM} (24)
Variables specifying other aspects of motion	Time	30.6% (3,758)	AdvP (1,751), NP _{ADE} (769), AdpP (390)
	Manner, including speed	22.7% (2,780), 3.2% (399)	AdvP (1,106), NP _{COM} (604), NP _{ADE} (201)
	Purpose	3.7% (456)	InfClause (367), AdvP (62), AdpP (14)
	Result	1.6% (194)	NP _{COM} (39), AdvP (34), AdvP + NP _{GEN} (20)

Table 4: The presence or absence of spatial expressions in clauses that contain verbs of slow, medium, and fast motion.

VerbSpeedCat	Spatial expressions present (<i>N</i>)	Spatial expressions absent (<i>N</i>)
slowVerb	84.2% (2,526)	15.8% (474)
fastVerb	82.5% (2,724)	17.5% (576)
mediumVerb	78.6% (4,713)	21.4% (1,287)
Total	81% (9,963)	19% (2,337)

frequently, and Distance (as well as Purpose and Result) is expressed even less frequently. Furthermore, a considerable number of clauses also contain Time expressions and Manner expressions.

Regarding morphosyntax, adverb phrases are most frequently used for Manner, Time and Direction,⁸ noun phrases in elative for Source, noun phrases in inessive for Location, noun phrases in illative for Goal, and adpositional phrases for Trajectory. As for less frequently expressed categories, quantum phrases frequently express Distance, infinite verb forms Purpose, and noun phrases in comitative Result.

As another facet of background information, across verb types of speed, spatial circumstances are described in rather equal proportions (see Table 4). A large number of clauses (81%) contain a spatial expression other than the verb.

As for mover types, the majority of clauses (94%) express animate motion (see Table 5), and this may also explain the high rate of Direction and Goal expressions in the data. In a small set of clauses (4%), vehicles are indicated as movers. Inanimate motion is particularly rare in our dataset (1%), and in some cases, the animacy of the mover could not be established due to the lack of contextual cues.

Table 5: The distribution of different types of movers in the data.

MoverAnimacy	% of clauses, (<i>N</i>)
Animate	94.2% (11,583)
Vehicle	4.3% (527)
Inanimate	1.3% (163)
Unclear	0.2% (27)

⁸ Note that we call adverbs used to express Direction “adverb phrases” out of simplicity. The majority of such adverbs are actually verbal particles (i.e., satellites; the same applies to Trajectory). However, the distinction between the verbal particles, free adverbs and adpositions is rather vague and dynamic in Estonian, which makes it challenging (if not impossible) to draw fine lines between these morphological categories. Verbal particles can also be found within the categories of Source, Location, and most frequently, Trajectory.

Finally, it should be noted that among the motion verbs expressing either path or manner, three are source verbs, seven are goal verbs, and 31 are manner verbs (see Table 3). This reflects the typological profile of Estonian in that it has a rich inventory of productively used manner verbs (and that, in general, path verbs tend to form a closed class of verbs and manner verbs an open class of verbs). In any case, in the following analyses, this imbalance of the verbs should be kept in mind.

6.2 Interrelations

Regarding the characteristics of the clausal patterns of motion verbs expressing various degrees of speed, we expected to find significant differences in their characteristics. Particularly, we expected to find that verbs of fast motion are biased towards Goal (H1 & H2). Simultaneously, we expected that Goal should associate not only with fast motion, but also occur in frequent combinations with goal verbs (H2). In addition, our prediction was that if speed is extensively elaborated (particularly considering fast motion), spatial aspects would be less frequently depicted (H3).

General overview of interrelations between variables. For a general overview of possible interrelations between the variables, we present a multiple correspondence analysis (MCA) in which the top 50 contributing variable levels are plotted alongside individual clauses (see Figures 1 and 2). Variable levels that contribute less to explaining the variation in data are not presented in the Figures. Individual clauses are indicated by dots. Variables and their levels are indicated by text (for verbs, the variable name ‘Verb’ is omitted for clarity reasons). Figure 1 highlights clauses with different types of verbs (manner, source, and goal verbs; indicated by colours). Figure 2 highlights clauses according to the speed of the verb (slow, medium, fast). The following main observations can be made from these figures.

First, verbs tend to cluster according to their type in terms of being either goal verbs (in red in Figure 1), source verbs (in blue), or manner verbs (in yellow). This indicates that verbs of similar spatial semantics have similar semantic clausal patterns.

Second, source verbs (e.g., *väljuma* ‘exit’) cluster around Source expressions (presented as ‘Source_yes’ in Figure 1; e.g., *linnast* ‘from a town’), and the mover tends to be either inanimate or a vehicle (e.g., a balloon or a train). In other words, source verbs occur frequently in clauses together with Source expressions while also depicting inanimate or vehicle movers. Goal verbs (e.g., *sisenema* ‘enter’) cluster around Goal and Purpose expressions (indicated by ‘Goal_yes’ and ‘Purpose_yes’; e.g., *tuppa* ‘into the room, indoors’ (Goal) and *rohu järele* ‘for the

medicine' (Purpose)). Manner verbs are more diverse in their clausal realisation, with some (e.g., *sõudma* 'row', *jalutama* 'walk, stroll', and *hulkuma* 'wander') occurring close to Manner, Trajectory, and Location expressions (e.g., *vaikselt* 'quietly' (Manner), *mööda teed* 'along the road' (Trajectory), and *väljakul* 'at the square' (Location)), while others (e.g., *ruttama* 'hurry, rush', *kiirustama* 'hurry, rush') are positioned close to goal verbs, and Goal and Purpose expressions. That is, manner verbs tend to occur in more diverse clausal contexts with some being more similar (and others more distinct) to goal verbs in their typical clausal patterns.

Third, as shown in Figure 2, motion verbs do not form very clear clusters in terms of their speed as the colours that represent verbs from different speed types are rather mixed up. We can, nevertheless, observe that a set of fast motion verbs (e.g., *ruttama* 'hurry, rush', *kiirustama* 'hurry, rush') clusters together with goal verbs, whereas slow motion verbs (e.g., *tatsama* 'toddle' and *hulkuma* 'wander') are more widely distributed over the right-hand side of the figure close to Trajectory and Location expressions. This shows that particularly the verbs of fast motion are similar to goal verbs in their clausal patterns.

The structure of motion clauses. The data is further analysed by means of conditional inference trees to establish the main influencing factors and typical clausal patterns. Figure 3 presents the conditional inference tree for VerbSpeed as a response variable and Figure 4 for VerbCat as a response variable. VerbSpeed refers to the semantics of the verbs in terms of speed. VerbCat is an overlapping variable and shows not only speed, but also verb semantics in terms of expressing manner, source, or goal information. The explanatory variables in both models are those standing for the semantic structure of the clauses apart from the verbs themselves (i.e., Source, Location, Trajectory, Direction, Goal, Distance, Result, Time, Purpose, MoverAnimacy, Manner, SlowOrFast; see Table 1 in Section 5).

The tree for VerbSpeed (see Figure 3) indicates three main findings. Firstly, SlowOrFast divides all data into two sets with fast motion modifiers ('fastMod') occurring frequently with verbs that express relatively fast motion (see Node 2 and example (3)).

- A. (Manner) verb of fast motion + speed modifier of fast motion (animacy irrelevant)⁹

⁹ Note that the order of the elements may not be the same in the descriptions and example sentences. This is because Estonian has a relatively free word order and the order of the semantic elements can change from clause to clause. Thus, the descriptions with the labels (given as the introductory sentence to each of the examples A–F) may not be in the same order as they are in the actual example sentence.

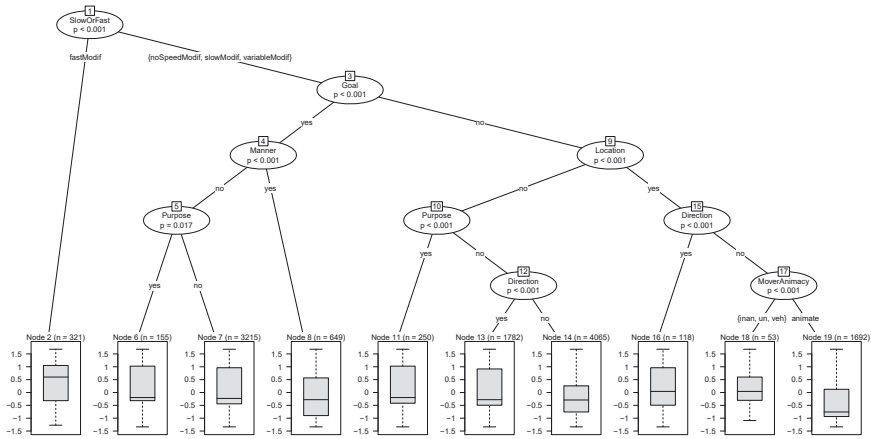


Figure 3: Conditional inference tree for VerbSpeed: $\text{VerbSpeed} \sim \text{Source} + \text{Location} + \text{Trajectory} + \text{Direction} + \text{Goal} + \text{Distance} + \text{Result} + \text{Time} + \text{Purpose} + \text{MoverAnimacy} + \text{Manner} + \text{SlowOrFast}$ (maxdepth = 5, minbucket = 50).

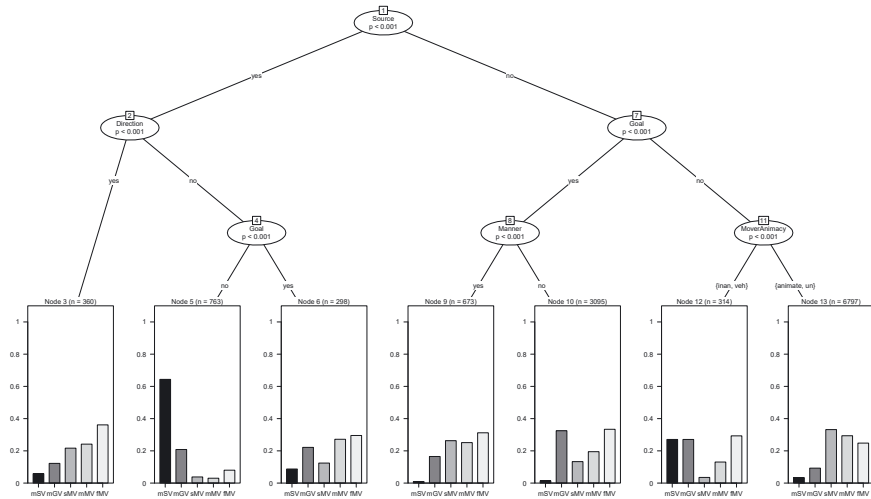


Figure 4: Conditional inference tree for VerbCat: $\text{VerbCat} \sim \text{Source} + \text{Location} + \text{Trajectory} + \text{Direction} + \text{Goal} + \text{Purpose} + \text{Distance} + \text{Result} + \text{Time} + \text{Manner} + \text{SlowOrFast} + \text{MoverAnimacy}$ (maxdepth = 3, minbucket = 50); fMV = manner verb of fast motion, mGV = goal verb (of medium speed), mMV = manner verb of medium speed, mSV = source verb (of medium speed), sMV = manner verb of slow motion.

- (3) *Päev otsa oli kihuta-tud päris kiire hoo-ga* [fastModif]
 day long be.PST.3SG race-PPP **rather fast.GEN pace-COM**
 ‘They had been racing at a rather fast pace all day long.’

Secondly, when Goal, Purpose, or Direction is expressed (‘yes’), the verbs tend to also express faster motion, as evidenced by Nodes 6, 11, 13, and 16 (see examples (4) and (5); note, however, that the median values are not very high).

- B. (Manner) verb of fast motion + Goal/Purpose/Direction expression (+ animate motion or vehicle as a mover)

- (4) *ja lapse-d torma-vad tupp* [Goal]
 and child-NOM.PL rush-PRS.3PL **room.ILL**
 ‘And the kids rush inside [lit. into the room].’

- C. Manner verb of any speed (but particularly fast speed) + Source expression + Direction expression (animacy irrelevant)

- (5) *lipsa-si-n telgi-st välja* [Source] *välja* [Direction]
 slip-PST-1SG **tent-ELA out**
 ‘I slipped out of the tent.’

Thirdly, verbs that express slower motion are more likely to be found in combination with Manner expressions, but interestingly, they then simultaneously combine with Goal expressions (see Node 8 and example (6)). Verbs of slow motion are also common in clauses that do not contain a combination of Goal, Location, Purpose, and Direction expressions (see Node 14) and in clauses that describe animate motion, express Location, but do not express Goal or Direction (see Node 19 and example (7)).

- D. Manner verb of any speed (but particularly slow speed) + Goal expression + Manner expression (no Source; animacy irrelevant)

- (6) *hiili-si-n vaikselt oma tupp* [Goal]
 sneak-PST-1SG **quietly my room.ILL**
 ‘I sneaked quietly to my room.’

- E. Manner verb of any speed (but particularly slow speed) + animate motion (no Source; no Goal) &

- F. (Manner) verb of slow motion + animate motion + Location expression ((or Trajectory or Distance)) (no Goal; no Direction)

- (7) *kola-si-me parajasti Punase-l väljaku-l* [Location]
 loaf-PST-1PL at.that.time **Red-ADE square-ADE**
 ‘We were loafing at the Red Square at that time (when)’

We would like to stress that these results for VerbSpeed should be treated with caution because the overall performance of the tree model is rather poor in that Pearson's R^2 is 0.2 (the correlation coefficient varies from -1 to 1 and indicates how well the predictors explain the variation of the dependent variable). When the dependent variable is VerbCat, the conditional inference tree (see Figure 4) is different and the performance of the model is better. The classification accuracy of the model for VerbCat is 0.35. If the prediction was made randomly, it would predict source verbs (mediumSV) correctly in 7%, goal verbs (mediumGV) in 17%, slow and medium manner verbs (slowMV and mediumMV) in 24%, and fast manner verbs (fastMV) in 27% of the cases. Thus, the tree model for VerbCat predicts the clausal patterns better than by chance.

The two tree models also echo the findings from MCA (see Figures 1 and 2) in that VerbType (i.e., whether the verb is a source, goal, or manner verb) seems to override VerbSpeed (i.e., the speed of motion a verb expresses). As presented in Figure 4, there are three main findings concerning source, goal, and manner verbs. First, source verbs ('mSV') are predominantly expressed in combination with Source expressions, and in these cases, Direction and Goal are not expressed (see Node 5 and example (8)). Source verbs are also common when the mover is inanimate or a vehicle (see Node 12 and example (9)).

G. Source verb + Source expression (no Goal; no Direction)

- (8) *Abielupaar välju-b auto-st* [Source]
 married.couple.NOM exit-PRS.3SG **car-ELA**
 'A married couple gets out of the car.'

H. Source verb + inanimate/vehicle mover (no Source; no Goal)

- (9) **Rong** välju-b kl 19.15
train.NOM exit-PRS.3SG at 19:15
 'The train leaves at 7.15 pm.'

Second, goal verbs ('mGV') are frequently used in combination with Goal (and/or Purpose) expressions so that Source and Manner are not expressed (see Node 10 and examples (10) and (11)) or so that Source is expressed and Direction is not (see Node 6 and example (12)).

I. Goal verb + Goal expression ((and/or Purpose)) (no Source; no Manner; animacy irrelevant)

- (10) *Kui tuletõrjuja-d majja* [Goal] *sisene-si-d, ...*
 when firefighter-PL.NOM **house.ILL** enter-PST-3PL
 'When the firefighters entered the house, ...'

- (11) *Lähen mere äärde* [Goal] *jooks-ma* [Purpose], ...
 GO.PRS.1SG **sea.GEN to run-INF**
 ‘I’m going to the sea for a jog, ...’

J. Goal verb + Goal expression + Source expression (no Direction; animacy irrelevant)

- (12) *buss suundu-s Haifa linna-st* [Source] *Jerusalemma* [Goal]
 BUS.NOM head-PST.3SG **Haifa.GEN town-ELA Jerusalem.ILL**
 ‘The bus was heading from Haifa to Jerusalem.’

Third, manner verbs of all three types (‘fMV’, ‘mMV’, and ‘sMV’) are somewhat more frequent in combination with Source and Direction expressions (see Node 3 and example (5)), with Manner expressions (when Source is not expressed and Goal is expressed; see Node 9 and example (6)), or when the mover is animate (and Source and Goal are not expressed; see Node 13 and example (7)). In the first pattern, fast motion verbs are more frequent than medium and slow motion verbs, whereas when animate motion is described (the third pattern), slow motion verbs tend to be used.

Importantly, these patterns are only tendencies, and the data successfully accommodates a rich set of other structures and various counterexamples to the general patterns presented above. Overall, the patterns are least varied for source verbs and most varied for manner verbs. This phenomenon may also be caused by the unequal number of verbs included in the data (3 and 31, respectively). Moreover, manner verbs constitute a diverse set of verbs in which various dimensions are lexicalised, which, in turn, may influence the diversity of clausal patterns.

Speed modifiers across the clauses containing spatial expressions.

Finally, we hypothesised that salient manner information in terms of speed would result in patterns that would background spatial information (H3). Measuring saliency in the corpus data can be challenging as, in essence, saliency is a psychological concept (see also Schmid 2007; Slobin 2006). However, and as a simple measure, we can compare clauses that contain a Speed modifier with those that do not (we suggest that adding an extra element of speed information when the verb itself carries speed information can be taken as a sign of meaning intensification). When we look at the number of instances of spatial expressions (Source, Location, Trajectory, Direction, Goal, and Distance) across clauses with Speed modifiers (Speed+) and those without (Speed-), we find that the difference between Speed+ and Speed- clauses is significant but small ($\chi^2(1, N = 12,300) = 34.37, p < 0.001$, Cramér’s $V = 0.05$; see Table 6). Spatial expressions are present in 70% of Speed+ clauses and in 81% of Speed- clauses. In other words, intensified Speed meanings correspond with slightly less nuanced descriptions of space, but this

Table 6: The presence or absence of spatial expressions in clauses that contain Speed modifiers (Speed+) and in those that do not (Speed-).

	Spatial expressions present (N)	Spatial expressions absent (N)	Total (N)
Speed-	81.4% (9,685)	18.6% (2,216)	100% (11,901)
Speed+	69.7% (278)	30.3% (121)	100% (399)
Total	81% (9,963)	19% (2,337)	100% (12,300)

difference, though statistically significant, is very small as indicated by the very low value of Cramér's V .

Furthermore, if spatial expressions and Speed modifiers are simultaneously present in a clause (see Table 7), with Speed modifiers of fast motion, Goal is most frequently expressed (33%; as was also our expectation), and with Speed modifiers of slow motion, Direction and Trajectory are predominantly expressed (42%; $\chi^2(5, N = 340) = 21.92, p < 0.001$, Cramér's $V = 0.25$). The first tendency is exemplified in (13) and the second one in (14).

K. Speed modifier of fast motion + Goal expression

- (13) *Hall hiirekuningas siba-s kiiresti [fastModif] kurja*
 grey.NOM mouse.king.NOM scurry-PST.3SG **fast** **evil.GEN**
nõiamoori juurde [Goal]
witch.GEN to
 'The grey cat scurried quickly to the evil witch.'

L. Speed modifier of slow motion + Direction expression (+ Trajectory expression)

- (14) *Väga aeglaselt [slowModif] komberda-n piki platoo-d [Trajectory]*
very slowly stumble-PRS.1SG along plateau-PART
allapool [Direction]
downwards
 'Very slowly, I'm stumbling down the plateau.'

Table 7: The distribution of speed modifiers across spatial expressions.

	Source (N)	Location (N)	Trajectory (N)	Direction (N)	Goal (N)	Distance (N)	Total (N)
fastModif	15.3% (42)	8% (22)	13.8% (38)	27.6% (76)	32.7% (90)	2.5% (7)	100% (275)
slowModif	4.6% (3)	10.8% (7)	24.6% (16)	41.5% (27)	12.3% (8)	6.2% (4)	100% (65)
Total	13.2% (45)	8.5% (29)	15.9% (54)	30.3% (103)	28.8% (98)	3.2% (11)	100% (340)

To summarise, there is much variation in the data. Nevertheless, as presented above, a number of characteristic patterns emerge from the exploratory and hypothesis-testing analyses. Typical clausal patterns of space relate to verb semantics and the expression of space relate to the speed of motion that is described.

7 General discussion

In this paper, we aimed to establish possible speed effects in motion descriptions by analysing how speed-related information is expressed in relation to other features that characterise motion descriptions in Estonian. More specifically, we assessed (i) the distribution and frequencies of manner and spatial expressions, (ii) combinations of verbs (varying either in their reference to different degrees of speed or in their expression of manner or path) and semantic units (e.g., Source and Goal), and (iii) the clausal structure of motion descriptions that contain multiple speed expressions as compared to those that contain no extra information about the speed of motion.

Based on our extensive corpus analysis, we can conclude that speed effects do occur in the data in that motion verbs of different speeds have somewhat distinct clausal patterns. Fast motion verbs tend to co-occur with Goal, Purpose, and/or Direction expressions (regardless of the animacy of the mover), whereas slow motion verbs tend to combine with Location expressions and animate movers. In other words, fast motion verbs are more commonly chosen to describe highly dynamic and goal-directed events, whereas slow motion verbs are chosen when the description focuses more on the static aspects of motion. Nevertheless, the semantics of the verbs in terms of being source, goal, or manner verbs seems to be of the utmost importance. That is, goal verbs tend to co-occur with Goal, source verbs with Source, and manner verbs (to some extent) with Manner expressions. This provides evidence for semantic congruency (for similar observations in diverse languages, see, for example, Akita 2017; Bohnermeyer and Stolz 2006; Cardini 2012; Kita 2006; Kopecka 2010; Rakhilina 2004; Slobin et al. 2014; Stefanowitsch and Rohde 2004).

Furthermore, the faster the motion expressed by the manner verb, the more similar the manner verb tends to be to goal verbs in that both types of verbs combine with Goal expressions. The slower the motion expressed by the manner verb, the more distant it is from source and goal verbs; instead, such manner verbs tend to combine with Location and/or Trajectory expressions. A similar observation has been made by Matsumoto (2020) who demonstrates that Japanese manner verbs of fast motion can combine with the Goal marker *ni*, whereas verbs of slow motion do not. In French, a corpus study of Kopecka (2009) has shown that when

manner verbs lexicalising fast motion co-occur with locative prepositions, they are more likely to contribute to the expression of change of location (as the path verbs do) than the verbs lexicalising slow motion. Moreover, as further evidence of semantic congruency, combinations of fast motion verbs and fast motion modifiers are very frequent in our data (at the same time, combinations of slow motion verbs and slow motion modifiers are much less frequent). This also suggests that manner verbs vary in the extent to which they convey directional meanings (see also Lewandowski and Mateu 2020), with fast motion verbs being more directional than slow motion verbs.

Even though semantic congruency overrides the *goal-over-source* bias in that the expression of Goal tends to co-occur with goal verbs and manner verbs of fast motion, such congruency also promotes the *fast-over-slow* bias as it applies specifically to fast motion and less frequently to slow motion. Nevertheless, Direction and Goal are the most frequently expressed spatial categories in our data. The predominance of these categories may also be explained by the fact that the vast majority of the clauses in our data describe the motion of animate figures. In any case, this accords with studies of the *goal-over-source* bias that suggest the predominance of Goal in terms of being the most frequent or salient spatial category, particularly concerning animate motion (e.g., Johanson et al. 2019; Kabata 2013; Lakusta and Landau 2005).

The relationship between the typological profile of Estonian (a satellite-framed language) and the *goal-over-source* bias can be evaluated in the light of Slobin's observation that satellite-framed languages are particularly prone to elaborating spatial aspects (e.g., Source and Goal) within the motion clause (Slobin 1996, 2004). This, in turn, is related to the degree to which a language is path salient even though satellite-framed languages can also be low-path-salient and verb-framed languages high-path-salient languages (Ibarretxe-Antuñano 2009; Ibarretxe-Antuñano and Hijazo-Gascón 2012). For more conclusive inferences, one would need to compare Estonian with other languages. However, the current study suggests that Estonian does indeed pay attention to both manner and path by depicting manner in a fine-grained way and by elaborating diverse spatial aspects of motion. Thus, Estonian is a good candidate for being classified as a highly path-salient language (as is also shown in a recent study of frog stories in Estonian (Taremaa et al. to appear).

Another issue that should be investigated in future studies is variation in motion descriptions (see also Montero-Melis 2021 for a recent in-depth analysis of event- and speaker-related variation in motion descriptions). Even though we could outline some principal tendencies in the data at the group level of the verbs, there is much variation in these groups and, more essentially, at the verb level. That is, each verb seems to have its own favoured linguistic contexts in which it

occurs (for further illustration, see Taylor 1996), which is why studies detailing the behaviour of individual verbs as well as those analysing a large and representative set of verbs should be undertaken in future research.

Finally, languages can distribute semantic components differentially (i.e., in a complementary way) and congruently (i.e., in a repeated way) (Harris 1954; Özçalışkan and Slobin 2003; Sinha and Kuteva 1995). The semantically congruent patterns found in this study can be seen as manifestations of redundancy and, whether named so or not, have been previously discussed in the literature on motion events. For example, Slobin et al. (2014) observe that, particularly in satellite-framed languages such as English and Polish, manner modifiers and verbs of similar meaning tend to combine. Stefanowitsch and Rohde (2004) demonstrate that English source-oriented verbs (in their analysis, *fall* and *escape*) frequently occur with Source expressions. Cardini (2012), in his analysis of Italian, claims that manner verbs that embed strong directional meanings co-occur with Goal expressions. Such concurring patterns are presumably essential in language production for two reasons. Firstly, they enable specification of the events when more details are needed to present in addition to the more general meaning of the verb. Secondly, they allow speakers to give more emphasis to the most relevant aspects of an event while backgrounding information that is less essential for successful conceptualisation.

Thus, such congruent patterns can be seen as tools for the windowing of attention, a concept proposed by Talmy (2000a). Furthermore, in line with Janda and Reynolds (2019: 467) who state that “redundancy actually facilitates construal”, we suggest that semantic congruency in motion events can be an essential tool of construal. As such, the role of congruency in conceptualisation and construal is a promising venue for further research. Motion events, including the expression of both path and manner, might offer a highly productive foundation on which to investigate this issue.

Data availability statement

The data and reproducible R code are available in the data repository DataDOI at <https://doi.org/10.23673/re-364> (Taremaa and Kopeccka 2022b).

Abbreviations

1, 3	person
ADE	adessive

fMV	manner verb of fast motion
GEN	genitive
COM	comitative
ELA	elative
ILL	illative
mGV	goal verb of medium speed
mMV	manner verb of medium speed
mSV	source verb of medium speed
NOM	nominative
PART	partitive
PL	plural
PPP	passive past participle
PRS	present
PST	past
SG	singular
sMV	manner verb of slow motion

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