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Motion event descriptions in Swedish, French, Thai and Telugu: a study in post-Talmian motion event typology

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ABSTRACT

Motion-event typology has moved into a “post-Talmian” terrain of approaches focusing on an open-ended number of patterns across languages and constructions. Following a proposal to distinguish between four typological clusters, we systematically compared the motion event descriptions in four languages suggested to exemplify these clusters: Swedish, French, Thai and Telugu, with the help of an elicitation-based study. 20 adult native speakers of each language were asked to describe 52 motion events, 38 of which were translocative. The stimuli varied with respect to the parameters caused/uncaused, bounded/unbounded motion as well as the viewpoint from which they were filmed. The descriptions were analyzed following *Holistic Spatial Semantics* and compared with respect to the categories Path, Direction, Region, Landmark, Manner and Cause, as well as the means of expressing these. The four languages patterned differently in significant ways. In terms of Path expression, French lagged behind the other languages, but with respect to Direction, it patterned together with Swedish. We demonstrate a number of such criss-crossing patterns, showing that there is no way to group the languages, thus implying at least four distinct typological prototypes. Further, we show that different kinds of motion situations, corresponding to different constructions, need to be compared separately.

KEYWORDS Path; Direction; Manner; typological prototypes; Holistic Spatial Semantics

1. Introduction

In the last decades of the previous century, Leonard Talmy proposed a number of typologies in relation to the lexical and grammatical expression of motion (cf. Fortis and Vittrant 2016), but it is the typology suggested by

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Talmy (1991) concerning alternative ways of “framing” motion events (and their extensions into other domains) that proved to be the most influential. In brief, Talmy claimed that all languages fall either into the *verb-framed* type (e.g. the Romance languages), or the *satellite-framed* type (e.g. the Germanic and Slavonic languages) depending on how they predominantly express the semantic category Path, which was supposed to reflect the core of a motion event: through the main verb root (e.g. Spanish *entrar*, ‘go in’) or in a so-called satellite, either a prefix (e.g. Russian *в-ходѹмь*, *в-ходит*, ‘in-walk’) or verbal particle (e.g. Swedish *springa in*, ‘run into’).

Research in the last two decades, however, has clearly shown that this binary typology is wanting in descriptive and explanatory adequacy. One problem is that the focus on verbs and “satellites” as the key expressions of a motion event is much too limited (e.g. Beavers, Levin, and Tham 2010; Croft et al. 2010). A second problem is that the structural category “satellite” has proven controversial: does it only include verbal prefixes and post-verbal particles, in a “sister relation to the verb root” (Talmy 1985, 102) as originally defined, or does it also include prepositions, and other constituents (Imbert 2012)? Or should it rather be defined in more functional and relational terms (Fortis and Vittrant 2016)? Further, while languages like Spanish and English – serving as the examples for the original two types, respectively – may be reasonably well described as differing in the ways suggested by Talmy, most languages that have been investigated do not appear to fall into either of the two general types (Levinson and Wilkins 2006; Slobin 2004; Fortis and Vittrant 2016). Moreover, this applies not only to languages such as Thai and Basque that can be expected to differ given their genealogical and typological characteristics, but even to familiar European languages like German and Italian, including their various dialects (Berthele 2013). In short, there is too much “type-internal”, and even language-internal, variation to be accommodated by a discrete binary typology such as that proposed by Talmy. Finally, and arguably most problematic for the model, there have been multiple observations that the key conceptual/semantic categories on the basis of which the typology is defined, such as Path, Manner and Motion itself, lack clear definitions (Blomberg 2014; Imbert 2012; Zlatev, Blomberg, and David 2010).

Hence, in the last decade or so the field can be said to have moved into a “post-Talmyan” terrain of motion typology research (Naidu et al. 2018), with various proposals on how to develop a better model. Least radical are those, such as that of Slobin (2004), to extend the typology with a third, “equipollently-framed” type, where Path and Manner of motion are expressed in structurally similar ways, as by different verbs in serial-verb constructions in Thai. However, the coherence of such a third type can be questioned, since serial-verb languages differ from one another in this

respect, and typically also contain other means of expressing Path, including prepositions (e.g. Fortis and Vittrant 2016).

Another relatively minor revision is to generalize from “verbs” and “satellites” to “head” and “non-head”, and divide languages on the basis of whether they display *head Path-coding* vs. *non-head Path-coding* (Matsumoto 2018). Thai would thus be of this first kind, along with Spanish, given that meanings such as ENTER and EXIT are commonly expressed by verbs. This classification, however, is problematic, since in many other ways serializing languages like Thai rather pattern together with languages like English and Swedish, allowing, for example, up to three different “ground elements” (landmarks) in a single clause, as shown in the English sentence (1). The number of ground elements allowed in a single clause has in fact been proposed as the basis for an alternative motion event typology (Bohnenmeyer et al. 2007).

(1) *The horse ran out of the barn, over the field into the woods*

Source Route Goal

Most radically departing from Talmian territory have been proposals to redefine motion typology in terms of *construction* types, defined either structurally or functionally (Croft et al. 2010; Fortis and Vittrant 2016). As different Path-expressing constructions can combine in an open-ended manner, the number of potential language types becomes, on this approach, indefinite.

Summarizing much of this critique of the Talmian binary model, and the surge of recent alternatives, Naidu et al. (2018) conclude that “current work on motion event semantics can be regarded as ‘post-Talmian’ in the sense that the field is both indebted to the model and agrees that a more adequate theory is called for.” Aiming to contribute to this quest, the authors used a particular theoretical model, *Holistic Spatial Semantics* (HSS), aiming to show that it is capable of addressing challenges such as those stated in the previous paragraphs. In support of this claim, Naidu et al. (2018) showed that Thai and Telugu speakers used significantly different patterns in the expression of self-motion events, and thus that the two languages cannot coalesce into a third “equipollent type”. At the same time, both languages differ substantially from the two original Talmian types, exemplified by languages like Swedish and French, respectively. Hence, Naidu et al. (2018) asked a key question and proposed a hypothesis:

From such a perspective, how many different language types – understood as clusters with distinct prototypes – can we expect to find in a motion event typology based on our theory? (...) Given our theoretical framework and empirical findings, (...) languages like Spanish and French, on the one hand, and languages like Swedish and English, on the other, correspond to *clusters with distinct prototypes*.

However, these will appear as only two such clusters, while serial verb languages like Thai (e.g. Ewe and Vietnamese) and languages like Telugu (e.g. Tamil and Finnish) will fall into clusters that are distinct from these, as well as from each other, thus giving us (*at least*) *four distinct typological prototypes*. (our emphasis)

In this paper, we aim to explicitly test this prediction of “(at least) four distinct typological prototypes”, on the basis of novel data from four different languages that can be expected to correspond to these typological prototypes: Swedish, French, Thai and Telugu. The data was elicited with the help of a new elicitation tool, described in [Section 3](#). Our approach and elicitation tool allow us to consider a larger scope of motion event constructions than the *bound, self-caused motion* ones such as those in (1), most often analyzed in the literature. In particular, we show that *caused-motion* constructions, with distinct Agent and Figure expressed by separate noun phrases as that in (2), and *unbound* motion constructions, such as those expressed with deictic verbs like in (3), or directional expression like (4) need to be considered in a comprehensive typology of motion event expression, as languages do not need to pattern the same way with respect to such different motion event constructions.

(2) *John tossed the ball into the basket*
 Agent Figure Landmark

(3) *Mary is coming this way*

(4) *The elevator is going up*

In [Section 2](#), we describe our theoretical framework, which is essentially the same as that used by Naidu et al. (2018), *Holistic Spatial Semantics* (HSS). But given the need for conceptual clarity, we also summarise the taxonomy of motion situations proposed by Zlatev, Blomberg, and David (2010), which also served as the basis for designing the mentioned novel elicitation tool. We describe the methodology of our study in [Section 3](#), present the results in [Section 4](#), and discuss them in [Section 5](#). In [Section 6](#) we conclude by summing up the relevance of our study for post-Talmian motion semantics.

2. Theoretical framework

A precondition for any semantic typology of motion events is a clear definition of the concept of *motion* (Blomberg 2014). Following the phenomenology-inspired analysis presented by Zlatev, Blomberg, and David (2010), the phenomenon of (observed) motion may be characterized in general terms as *change of the position of a figure against a background*. This can then be divided into 8 different kinds of *motion situations*, depending on three different parameters: *translocation* (change in average relative position of a figure

Table 1. Classification of the eight *motion situations* using English as a meta-language; F = Figure, LM = Landmark, C = Cause, VC = Viewpoint-centred, GC = Geocentric, OC = Object-centred frame of reference (based on Zlatev, Blomberg, and David 2010).

	Uncaused motion	Caused motion
Translocative, Bound	F goes from LM (Begin) F goes over LM (Mid) F goes to LM (End)	C takes F from LM (Begin) C throws F over LM (Mid) C puts F into LM (End)
Translocative, Unbound	F goes away (VC) F goes up (GC) F goes forward (OC)	C takes F away (VC) C pushes F upward (GC) C pushes F forward (OC)
Non-translocative, Bound	F jumps	C breaks F in pieces
Non-translocative, Unbound	F waves	C waves F

according to a frame of reference), *boundedness*,¹ and *causation*, as shown in Table 1, and elucidated further below.

This taxonomy of motion events can be naturally integrated with the theory of *Holistic Spatial Semantics* (Zlatev 1997, 2007; Blomberg 2014; Fagard et al. 2013), which aims to provide a common conceptual framework for conducting semantic typology of both location and translocation. A basic assumption is that the minimal unit of analysis is *the whole locative or translocative utterance*, where the meaning of the parts is dependent on the whole and vice-versa. Given that the utterance is the minimal independent move in a conversation, “minimal” translocative utterances are expressions like *Out*, *Down* and *There*, which can serve as answers to the question: *Where are you going?* (Imagine a grumpy teenager). The theory takes a middle road between universalism and diversity by assuming a closed set of *general semantic categories* such as Motion and Path.² These are grounded in pre-linguistic bodily experience, but conventionalized in language-specific ways, both with respect to the *values* these categories assume (especially for Region and Manner), and with respect to how they are expressed in individual languages. The following seven semantic categories are claimed to be necessary for the analysis of spatial semantics across the world’s languages:

- **Figure (F):** the focal entity that is located, or undergoes translocation;
- **Landmark (LM):** one or more physical entities (expressed by nominals) in relation to which the location or translocation of the Figure may (but need not) be specified;

¹The relevant sense of boundedness is here spatial rather than temporal, corresponding to the notion of q(uality)-boundedness rather than to t(emporal) boundedness in Croft’s (2012) two-dimensional model of aspect. Thus, for example: *He went to school* and *He was going to school*, are equally q-bounded, expressing Path: End, through the combination of the preposition *to* and Landmark-nominal *school*, even though they differ in t-boundedness, an aspectual distinction that we treat as orthogonal (see Zlatev, Blomberg, and David 2010).

²We use initial capital letters for all (and only) *semantic* categories, motivated by perceptual and other non-linguistic factors, but sedimented as conventional, in part language-specific, meanings (Zlatev 1997).

- **Region:** an area of space often defined in relation to a Landmark, with values like IN, OUT, ABOVE, BELOW, BESIDE;
- **Motion (M):** perceivable actual motion (else the situation is stative);
- **Frame of Reference (FoR):** following Levinson (2003), but generalizing to dynamic situations and the vertical plane (Zlatev 2007), there are three different kinds of FoRs: (a) **Object-centred (OC)**, defined through one or more Landmarks, as in (2), (b) **Viewpoint-centred (VC)**, as in (3), covering the class of motion situations anchored at a deictic centre, and (c) **Geocentric (GC)**, which involves relatively fixed (“absolute”) reference points or axes, as expressed by (4). The explicit expression of this category is a requirement for an utterance to be considered (overtly) locative or translocative (Zlatev 2007; Blomberg 2014).
- **Direction:** a category expressing *unbounded translocation* (see Table 1), where the motion event is specified as a vector proceeding along one of the axes provided by a FoR, as shown in (5). Crucially, unlike the case of Path, there is no Landmark involved, as even in (5c), the relevant “object” is that of the Figure itself.

- | | | | |
|-------|--------------------------------------|------|------------------------|
| (5) a | <i>The plane is coming</i> | FoR: | VIEWPOINT-CENTRED (VC) |
| b | <i>The plane is flying north</i> | FoR: | GEOCENTRIC (GC) |
| c | <i>The plane is rolling backward</i> | FoR: | OBJECT-CENTRED (OC) |

- **Path:** a specification of *bound translocation*, where a Landmark and Region are recruited to specify the Beginning, Mid and/or End of the translocation, as shown in (6). This is similar to the notion of Path-function (Jackendoff 1992) or Path-schema (Regier 1996). If neither Direction nor Path is expressed (overtly) in a spatial utterance, the utterance is non-translocative, even if there is Motion, as in (7). Conversely, a value for Path does not necessarily imply a positive value for Motion, as shown by (6d).

- | | | | |
|-------|-------------------------------------|-------|---------------------|
| (6) a | <i>Mary walked out of the room</i> | Path: | Beginning; Motion + |
| b | <i>Mary walked through the room</i> | Path: | Mid; Motion + |
| c | <i>Mary walked into the room</i> | Path: | End; Motion + |
| d | <i>Mary is out of the room</i> | Path: | End; Motion – |

- (7) *Mary is running in the park*

Once again, this is the case because *translocation* is defined as change in the Figure’s relative average position according to one of the three spatial FoRs, and there is no translocation expressed in (7) with respect to the only

FoR that is expressed in the utterance by the prepositional phrase *in the park*, which is OC.³

The seven categories listed above are necessary but not sufficient for the full characterization of a motion event. Consistent with Talmy's original approach (but without regarding these as expressing a "co-event", as their centrality differs across languages and constructions) HSS treats the following three categories as secondary. Example (8) shows an English sentence expressing all three categories.

(8) *The pilot flew* *the plane in a spiral*
 Agent Motion+Cause+Manner Figure Shape

- **Manner:** specifications of various aspects of the way motion is conducted, including (a) bodily locomotion (e.g. *stride*), (b) vehicle (e.g. *drive*), (c) medium (e.g. *sink*), (d) velocity (e.g. *rush*), (e) attitude (e.g. *mindfully*), and possibly other kinds; these can be coded as values like BODY, VEHICLE, SPEED;
- **Shape:** In contrast to Manner, this concerns the geometrical form of the trajectory of movement (e.g. *zigzag*, *meander*);
- **Agent + Cause:** the instigator or the movement in caused motion events, and the specification of the nature of the causal force (e.g. *throw* vs. *kick*).

HSS explicitly predicts a *many-to-many* relationship between semantic categories and both lexical and grammatical form classes. This subsumes Talmy's (1985) notion of *conflation*, where more than one category is expressed by a single form class, as well as the converse notion of *distribution* (Sinha and Kuteva 1995). Consider the Swedish example in (9), with two cases of conflation (M+Manner = V, Path+Region = PRT), and one case of distribution (Region = PRT+PREP).⁴ The third pattern is systematic *composition* of different categories expressed in different form classes (Motion = V, Region = PREP).

(9) *Maria sprang* *in* *i* *rumm-et* (Swedish)
 Maria run.PST in in room-DEF
 NP V PRT PREP NP

Figure M+Manner Path:END+Region:IN Region:IN LM
 'Maria ran into the room.'

³Some have the intuition that (7) involves translocation since when imaging the described event it is impossible to do so without adding a subjective perspective, thus "seeing" Mary change her location relative to this. However, a Viewpoint-centred FoR is not part of the conventional construal of the sentence, so we maintain that it is non-translocative.

⁴This generalizes the notion of "double framing" in Path-expression (Croft et al. 2010), since any of the categories can be expressed in two (or more) morphemes in the same utterance, and not only Path.

This many-to-many relation between expression and meaning is a consequence of the *relative* meaning-holism predicted by the theory. On the one hand, the meaning of the translocative utterance as a whole will be a combination of the expressions of the different semantic categories, each one of which is potentially distributed. On the other hand, the meaning of the whole utterance constrains the interpretation of individual expressions and their semantic values. An aspect of the latter is the phenomenon of *covert expression*, where spatial meaning is not encoded semantically (conventionally), but emerges due to pragmatic (contextual) factors. We may, for example, contrast (9) with the French (10), where there is no explicit expression of Path. However, it may nevertheless be inferred, for example if we know that Paul had just heard a loud noise from inside the kitchen.

- (10) *Paul a couru dans la cuisine* (French)
 Paul AUX run:PST.PTCP in DEF kitchen
 Figure M+Manner Region:IN LM
 =>Path:END+Region:IN
 ‘Paul ran into the kitchen.’

HSS does not make any specific predictions about the number of distinct “language types” in a motion typology, but provides the conceptual tools to systematically compare languages, and thus approach the issue in an open-minded manner. For example, Blomberg (2014) presented the series of video-clips developed by Ishibashi, Kopecka, and Vuillermet (2006) for investigating the expression of “trajectory” cross-linguistically to speakers of Swedish, French and Thai, and coded these descriptions according to HSS. The descriptions of the motion events in the three languages indeed seemed to cluster according to the three types proposed by Slobin (2004), with Swedish speakers using mostly Manner verbs and Path particles, French speakers using Path and Direction verbs, and Thai speakers stringing Manner, Path and Direction verbs in serial-verb constructions. But there were also situation-specific patterns. For example, in vertical motion situations and corresponding constructions (e.g. *jumping down*) French speakers regularly used Manner verbs. In fact, Blomberg (2014) found a greater number of different kinds of Manner verbs in the French data than in the Swedish data.

In another typological study, Fagard et al. (2013) combined some of the data of Blomberg (2014) with elicited descriptions from the Italian regional language Piedmontese, German and Polish. The results showed that Thai, based on the data from the Blomberg (2014) study, was similar to that from

German and Swedish in allowing three “ground elements” (i.e. landmarks expressing Source, Route and Goal) per clause, as discussed in [Section 1](#). In terms of the frequency of Path expression, German surprisingly aligned with the two Romance languages, while Swedish, Thai, and Polish clustered together. With respect to Direction (and especially for VC FoR see above), the Thai participants used deictic verbs more frequently than the speakers of the other languages. German and Swedish were not far behind, while French and Piedmontese speakers used very few deictic verbs in boundary-crossing contexts, and Polish speakers did not mark deixis at all. Thus, the six languages did *not* cluster along a two or three-way typology, but formed criss-crossing patterns, depending on which criteria for comparison were used.

Such findings imply that it is not possible to give a conclusive answer to the question of “how many language types” (in motion event expression) need to be distinguished, before a sufficiently large number of languages have been explored, using a combination of qualitative and quantitative analysis, based on naturalistic data and a clearly defined theoretical framework. Our study of motion event expression in Swedish, French, Thai and Telugu described in the rest of this article was intended as a contribution to this endeavor.

3. Methods

3.1. Participants

20 adult native speakers of Swedish (12 female, mean age = 29;2), French (10 female, mean age = 42;11),⁵ Thai (10 female, mean age = 33;1) and Telugu (8 female, mean age = 22;10) were recruited in their respective countries for a task of providing descriptions of video-recorded events presented on a computer monitor. The Swedish participants were from Lund, the French from Annecy, the Thai from Hua Hin, and the Telugu from Hyderabad. All participants filled in an informed consent form, and were compensated for their participation.

3.2. Materials

A completely novel elicitation tool was developed for the study, with a number of features that made it more appropriate for our purposes than that of Ishibashi, Kopecka, and Vuillermet (2006). Most importantly, the tool was developed in accordance with the taxonomy of motion situations proposed by Zlatev, Blomberg, and David (2010), (see [Table 1](#)), with the broad understanding of the concept of (observed) motion as *change of position of a figure*

⁵The data from one of the French participants was lost due to technical error, so only 19 were analyzed.

Table 2. Distribution of motion event stimuli in accordance with the taxonomy of motion situations of Zlatev, Blomberg, and David (2010) (cf. Table 1).

Type of motion situation	Non-caused	Caused
Translocative, bound	12	8
Translocative, unbound	12	6
Non-translocative, bound	4	2
Non-translocative, unbound	4	4

against a background (see Section 2). 52 event stimuli were distributed along the three dimensions of translocation, (spatial) boundedness and causation, as shown in Table 2, and specified in more detail in the Appendix.

The 38 translocative events (the first two rows in Table 2) were fully balanced for viewpoint in the sense that for 19 events the angle of viewpoint was *parallel* to the motion of the figure, and for the others it was *orthogonal*, as shown in Figure 1. This parameter was important for investigating differences with respect to Viewpoint-based FoR, including deixis. As can be seen from Table 2, there was also full balance for boundedness, but less so for causation. The reason for the latter was that a greater number of events in the non-caused category was required so that we could manipulate the sub-variable away from/toward when motion was parallel to the viewpoint of the camera, with the figure translocating away from the position of the camera or toward it (see Appendix). Ideally, this variable could also have been manipulated for the caused motion stimuli, but for practical reasons (e.g., participant fatigue) we refrained from this.

The 52 motion events were video-recorded in a park area in Southern Sweden. The “actors” in these were three women, three men, a girl and a boy. A dog and a cat were used for some caused motion events (the dog was “called” and the cat “carried” away). The stimuli in the two lowest rows in Table 2 were not part of the focal data for the present study, given that they involved non-translocative events like *Man jumping on trampoline* (non-translocative, unbound, non-caused) and *Woman tears paper in two* (non-translocative, bound, caused), and may for present purposes be regarded as “fillers”. In addition, five video-recorded events served to let the participants familiarize themselves with the task. The video-recorded events were edited into 6–10 sec. long clips, and served as the stimuli for the study.

3.3. Procedure

All elicitations took place in a quiet room, one participant at a time. After the participant had been introduced to the task and filled in an informed-consent form, s/he was seated in front of a 15-inch laptop computer. First, the participant was presented with five training stimuli, with the instruction



(a) MAN KICKS BALL TO BENCH



(b) GIRL KICKS BALL FROM BENCH

Figure 1. Screenshots of two caused-bound (CB) motion situations, (a) from a viewpoint that is *parallel* to the movement, and (b) *orthogonal* to the movement.

(in the respective language): *Please describe what happened*. The training trials were used to “calibrate” the nature of the description: if participants were too laconic (e.g. “Man running”), they were asked to give some more details; if they were too wordy and included many irrelevant details, the opposite instruction was given. After the fifth trial, they were allowed to ask questions, and given the standard answer that descriptions should be “short, natural and informative”. After that, the elicitation based on the set of 52 stimuli commenced. They were presented in a fully randomized order that differed for each participant, using the stimulus-presentation software E-prime.

3.4. Analysis

The participants’ descriptions were recorded and transcribed in ELAN (Sloetjes and Wittenburg 2008). The transcriptions were segmented into clauses, using criteria that are appropriate for the languages. For Swedish and French, the familiar criterion of one-finite-verb-per-clause was sufficient. For Telugu, clauses were defined by the presence of either a finite or a non-finite verb. While finite verb forms inflect for tense and agreement with the grammatical subject as in (11), non-finite verb forms like that in (12) are marked with relevant tense-mood suffixes and denote events either anterior to or simultaneous with that denoted by the main clause (Krishnamurti, John, and Gwynn 1985; Haddad 2009; Kissock 2014). Even more complex criteria of clause-hood were used for Thai, given that verbs are not marked for any grammatical categories (Zlatev and Yangklang 2004).

(11) *oka magavaaḍu bamti-ni pai-ki visir-aa-ḍu* (Telugu)
 one man ball-ACC above-DAT throw-PST-AGR
 ‘A man threw the ball upward.’

(12) *adi parigettu-kumṭuu* (Telugu)
 that run-PTCP
 ‘that (dog), while running’

For the sake of efficiency and systematicity, “lexica” consisting of all the lexemes in the data for each language were automatically extracted, and each lexeme was (i) glossed into English, (ii) given a form-class and (iii) given *default values* (exemplified below) for the ten categories of HSS (as explained in Section 2). This is illustrated in Table 3 for Thai, using the original Thai orthography as in the actual Thai lexicon. In cases where expressions were systematically ambiguous (see the Thai expression glossed as ‘far’ in Table 3), this was indicated by “%” between the possible values.

Following this, the values in these lexica were used to automatically tag all event descriptions, for all languages. In the final step of the preliminary



Table 3. Six entries in the lexicon for Thai, with the original orthography in the first column.

Word	Gloss	Form class	FoR	Path	Direction	Region	Motion	Figure	LM	Manner	Cause	Shape
เดิน	walk-along	V	OC			ALONG	1					
ลอด	go-under	V	OC	END		BELOW	1					
กลาง	between	PREP	OC			BETWEEN						
ไกล	far	ADV	OC% VC			FAR						
ใน	in	PREP	OC			IN						
ใส่	insert	V	OC	END		IN	1				PLACEMENT	

analysis each clause, in each event description, was manually checked by a native speaker of the language in question. All ambiguities were resolved, values for covert expression, as in example (10), were added and various errors produced by the automatic tagging were corrected.

As a result of this analysis procedure, the data were analyzed in terms of clauses, glossed and coded for the ten categories of HSS (see Section 2). In accordance with the model, the coding allowed for categories to be expressed more than once in a clause (i.e. *distribution*) and a single form could express more than one category (i.e. *conflation*); the presence of *covert expression* was noted for each clause, and concerned above all the categories Path and Region. As pointed out in Section 2, unless there is an explicit (overt) expression of the category Frame of Reference (FoR) in a given clause, it is to be considered *non-spatial* (e.g. neither locative nor translocative). Hence, in the results reported in the following section, only clauses with value for FoR are considered. Static spatial descriptions (e.g. *the house is in a forest*) are locative, but lack a value for Motion, and therefore such clauses were also excluded from the analysis. In comparing the descriptions in the four languages, the following six HSS categories were subjected to detailed analysis, with values shown in parentheses:

- **Path:** bound motion (BEGIN, MIDDLE, END)
- **Direction:** unbound motion (UP, DOWN, LEFT, RIGHT, TOWARDS, AWAY FROM, FORWARD, BACKWARD)
- **Region:** an area of space, often in relation to Landmark (IN, OUT, BELOW, ABOVE, SURFACE, AGAINST, BETWEEN, AMONG, SURROUND, NEAR, FAR)
- **Landmark:** an inanimate or animate object in space, expressed by nouns or pronouns
- **Manner:** information on how the translocation takes place (BODY (a particular movement of the body): *walk vs. crawl*; SPEED: *rush vs. move*; VEHICLE: *ride vs. fly*; MEDIUM: *sink vs. fall*; POSTURE: *stand vs. crouch*, and ATTITUDE: *stride vs. stagger*)
- **Cause:** the force that gives rise to translocation in caused motion events (GENERIC: *make*; BALLISTIC: *throw*; CO-MOTION: *carry*; PLACEMENT: *put*)

Of the remaining HSS categories (see Section 2), FoR, Motion and Figure were always present in the analyzed clauses (given the definition of translocative clauses) and are thus not informative when comparing the languages in our sample. The final category Shape (expressed in words like *zigzag*, and *circle*) was very infrequent in the data, and omitted for this reason.⁶

⁶The data sets for the Swedish, French and Thai, produced within the PATOM project (see Acknowledgments) are available at the following site: <https://osf.io/3w9uj/>.

4. Results

As stated in Section 1, the goal of the study was to test the prediction stated by Naidu et al. (2018) that in motion event semantics there will be at least four distinct typological prototypes, exemplified by Swedish, French, Thai and Telugu, respectively. Hence, in this section we begin by presenting the overall distribution of HSS categories across the four languages. In a second step, we distinguish between the four types of translocative motion situations (i.e., those of the two first rows of Tables 1 and 2), and compare the way the speakers of the four languages expressed these. Finally, we make the comparison from the standpoint of the different structural (i.e., lexical and grammatical) resources of the four languages, looking at what kind of form classes each language employs for translocative meaning, and whether they participate in patterns of conflation or distribution.

4.1. General comparison

Table 4 shows the distribution of the number of clauses for the four languages, for those that were part of translocative motion descriptions of non-caused (24 stimuli) and caused (14 stimuli) motion situations, and then all clauses in these descriptions. As can be seen, the total numbers of clauses (right column) produced by the speakers from the four languages are comparable in size. The Telugu speakers produced most clauses overall, possibly due to the fact that non-finite verbs in the language defined their own clauses, as in (12), see Section 3.4. The Swedish participants provided the highest proportion of translocative clauses (77%). In all groups, the numbers of clauses describing a non-caused motion situation were approximately twice as high as the numbers of clauses describing a caused motion situation. This is not surprising, given that the number of stimuli eliciting non-caused motion was almost twice as high as the number of stimuli eliciting caused motion (see Table 1).

Table 4. Numbers of clauses in the stimulus descriptions of the 38 translocative motion situations: only those expressing translocative motion, divided in non-caused and caused, and in general. The parentheses in the non-caused and caused columns indicate proportions out of all translocative clauses within a language set, while the parentheses in the sum column indicate the proportion of translocative clauses out of all clauses within a language set.

Language	Translocative		Sum	All clauses
	Non-caused	Caused		
Swedish	519 (.62)	321 (.38)	840 (.77)	1096
French	481 (.66)	244 (.34)	725 (.65)	1116
Thai	512 (.66)	260 (.34)	772 (.70)	1108
Telugu	537 (.68)	254 (.32)	791 (.65)	1221

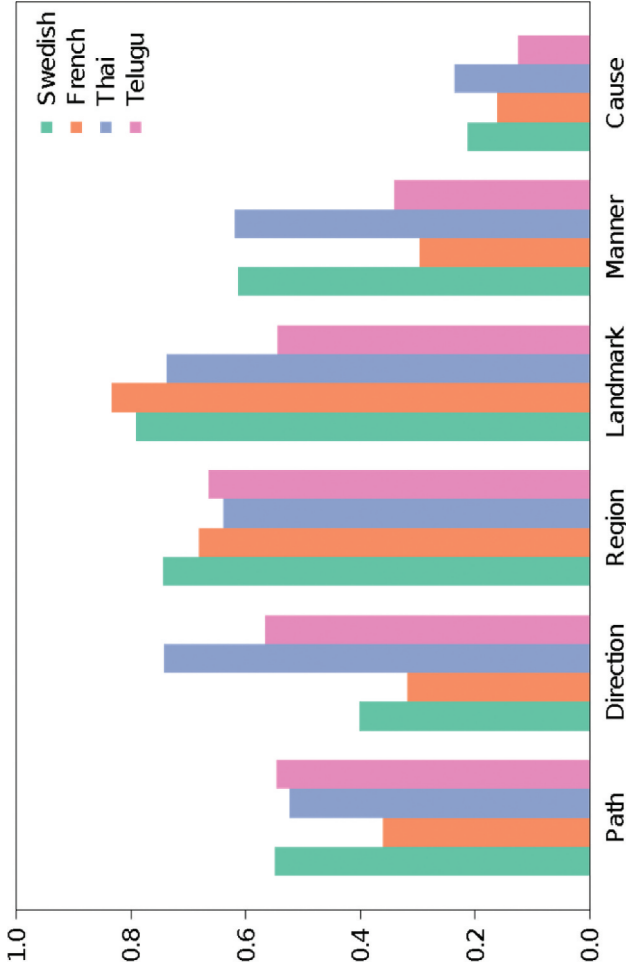


Figure 2. Proportions of clauses (from translocative motion clauses) expressing the categories Path, Direction, Region, Landmark, Manner and Cause in the four languages.

Figure 2 provides a bird's-eye view of how often the semantic categories Path, Direction, Region, Landmark, Manner and Cause were expressed in the four languages across the translocative clauses. Even this relatively generic representation shows major differences. In the descriptions below, the reported F-values represent the overall language effect within each category.

Starting from the left of the graph, the French speakers expressed Path less often than speakers from the other languages, and the difference between Path expression in the four languages was significant ($F(3,73) = 17.561$, $p = 0.000$). This difference was not compensated when covert expression of Path was considered.⁷ Turning to the expression of Direction – which to a considerable extent was due to deictic verbs (i.e. Viewpoint-centred FoR), there was again a significant difference between the four languages ($F(3,73) = 76.679$, $p = 0.000$) – and here Swedish patterned along with French, rather than with Thai and Telugu, both of which had higher rates than the former.

The rates of expressing Region were high and similar for the four language groups, but for Landmark expression, there was a significant difference ($F(3,73) = 3.669$, $p = 0.016$), with the Telugu speakers using Landmark expressions less often than speakers of the other languages. This was probably due to the fact that Telugu has highly productive locative nouns like *pai* ('above') that do not require a nominal expression, unlike the corresponding prepositions in the other three languages.

Finally, the rates of Manner and Cause were relatively lower compared to other categories, as could be expected, since the 24 non-caused motion stimuli would naturally have predominantly (though not exclusively) evoked Manner rather than Cause expressions, and conversely for the 14 caused motion stimuli. While the proportions for expressing Cause in the four languages were quite similar, there were considerable differences concerning Manner ($F(3,73) = 125.900$, $p = 0.000$). The Thai and Swedish speakers used Manner expressions in approximately 60% of all translocative clauses, while the Telugu and French speakers' use of Manner were on a comparatively low level. Based on the three categories where the major differences across the languages were found (i.e. Path, Direction and Manner, cf. Figure 2), we may observe that the languages fall in four distinct profiles, as shown in Table 5.

4.2. Analysis by motion situation type

A more nuanced picture, but still supporting the conclusion that the four languages patterned differently, emerges if we consider the four types of

⁷Covert expression proportions of Path (per all translocative clauses) for the four languages were: 2.5% for Swedish, 6.6% for French, a 13.2% for Thai, and remarkably 0% for Telugu, possibly due to the non-finite verb clauses.

Table 5. Schematic illustration of the differences between the four languages: high = more than 50% and low = less than 40% (of all translocative clauses).

	Path	Direction	Manner
Thai	High	High	High
Swedish	High	Low	High
Telugu	High	High	Low
French	Low	Low	Low

Table 6. Proportions of clauses expressing each semantic category for the four kinds of motion situations, represented by corresponding stimuli (see Appendix). Darker cells represent higher proportions.

Situation types		Path	Direction	Region	Landmark	Manner	Cause
Uncaused-unbound (UU)	Swedish	0.309	0.720	0.833	0.935	0.947	0.004
	French	0.099	0.639	0.464	0.888	0.536	0.000
	Thai	0.366	0.800	0.391	0.774	0.898	0.004
	Telugu	0.393	0.698	0.492	0.544	0.675	0.012
Uncaused-bound (UB)	Swedish	0.777	0.234	0.791	0.780	0.821	0.004
	French	0.706	0.129	0.835	0.863	0.286	0.024
	Thai	0.733	0.653	0.856	0.798	0.834	0.007
	Telugu	0.712	0.663	0.723	0.604	0.260	0.007
Caused-unbound (CU)	Swedish	0.333	0.516	0.540	0.635	0.214	0.468
	French	0.286	0.173	0.612	0.653	0.143	0.357
	Thai	0.326	0.853	0.442	0.400	0.158	0.642
	Telugu	0.653	0.265	0.816	0.276	0.112	0.398
Caused-bound (CB)	Swedish	0.677	0.164	0.697	0.728	0.159	0.605
	French	0.247	0.226	0.822	0.822	0.041	0.527
	Thai	0.515	0.752	0.745	0.782	0.133	0.721
	Telugu	0.423	0.365	0.744	0.609	0.096	0.359

motion situations that were represented in the stimuli separately. The proportions are shown in Table 6, with the degree of shading in the cells corresponding to the size of the proportions. Dark-shaded cells indicate that a category was strongly represented (i.e. expressed often by the participants). The category Path, for instance, understandably predominates in uncaused-bound (UB) motion situations in all four languages, while Direction predominates in uncaused-unbound (UU) motion situations, which is natural given that Direction is the semantic category of vector-like motion, defined by a Geocentric or Viewpoint-based FoR (e.g. “up-down” or “this/that way”). Manner was clearly more often expressed in uncaused than in caused situations, while the reverse was the case for Cause. Note, however, that these correspondences are only approximate, since the *linguistic* construal of a situation is never determined by its *perceptual* properties. In fact, it is crucial to distinguish between perceptual and non-linguistic categories like *uncaused-bound motion situations* (as those reflected in the corresponding stimuli), on the one hand, and semantic and linguistic categories such as Bound motion (expressed by the category Path, rather than Direction), on the other. It is for this reason that we consistently use lower-case letters for

the former, and initial capitals for the latter. In fact, we consider the dissociation between such perceptual and linguistic construal as one of our key contributions, as explained in Section 6.

Table 7 shows for which cells in Table 6 the differences between the languages were found to be statistically significant. This was always the case, except for the expression of Cause in uncaused (bound and unbound) situations, which was (expectedly) low across all languages. Additionally, the expression of Path was not significantly different across all languages in uncaused-bound (UB) situations, and the expression of Manner was not significantly different across the languages in caused-unbound (CU) situations.

Let us consider each one of the four situation types in more detail. Starting with the uncaused-unbound (UU) motion situations, Swedish appears to stand out with a much higher rate of Region expression than the other languages, apparently due to the frequent use of locative prepositions as in example (13).

- (13) *En kvinna gå-r upp på ett berg* (Swedish)
 INDEF woman walk-PRS up on INDEF mountain
 Figure M+Manner Direction Region LM
 ‘A woman walks up on the mountain.’ (Code: 3174)⁸

For this motion situation type, French had almost no expression of Path, which to remind requires verbs or other markers expressing Bounded motion. Examples like (14) commonly used to describe examples of this situation type only express Direction, with respect to which French was similar to the other languages. This strong preference of Direction over Path for this situation type helps explain the low proportion of Path in French in general (cf. Figure 2).

- (14) *Un monsieur monte sur une colline*
 INDEFman climb.up.PRS on INDEF hill
 Figure M+Direction Region LM
en courant (French)
 running
 Manner
 ‘A man runs up the hill.’ (Code: 7950)

Turning to the uncaused-bound (UB) situation type, we see a different pattern with the French data resembling those for Swedish when it comes to low rate of Direction, but with a high rate of Path expressions, as in (15).

⁸All codes denote clause-numbers in the respective data sets.

Table 7. F-values and p-values for language effects within the cells displayed in Table 6.

Situation types	Path		Direction		Region		Landmark		Manner		Cause	
	F (3,73)	p	F (3,73)	p	F (3,73)	p	F (3,73)	p	F (3,73)	p	F (3,73)	p
Uncaused-unbound	13.893	.000	3.637	.019	24.337	.000	25.703	.000	42.317	.000	1.957	.128
Uncaused-bound	1.062	.371	91.119	.000	5.286	.002	12.629	.000	182.160	.000	1.910	.136
Caused-unbound	11.461	.000	64.070	.000	10.306	.000	15.183	.000	0.729	.538	5.351	.002
Caused-bound	18.302	.000	40.227	.000	3.086	.032	5.966	.001	3.597	.017	12.484	.000

- (15) *Une femme sort de son bureau* (French)
 INDEF woman leave.PRS from POSS office
 Figure M+Path Path LM
 ‘A woman goes out of her office.’ (Code: 7290)

Swedish and Thai were found to be similar with respect to a high rate of expressing Manner, both for this and the preceding motion situation type. This distinguishes these two languages quite clearly from French and Telugu, especially for the uncaused-unbound (UB) situation type. With respect to the expression of Direction, however, this was much more prominent for Thai than for Swedish. This can be explained by the fact that Thai naturally allows the combination of Manner and Direction (as well as Path) in a single clause, expressed by a series of verbs, as in (16). Swedish, on the other hand, requires speakers to choose either Manner or Direction as the main verb, as in (17), where only Manner is expressed.

- (16) *Puying doen khâw pay nay hōŋ* (Thai)
 woman walk enter go in room
 Figure M+Manner M+Path M+Direction Region LM
 ‘A woman walks out from a room.’ (Code: 2997)

- (17) *En person spring-er ut*
 INDEF person run-PRS out
 Figure M+Manner Path+Region
från ett uthus (Swedish)
 from INDEF shed
 Path LM
 ‘A person runs out from an outhouse.’ (Code: 2889)

With respect to the expression of Direction in uncaused-bound (UB) situations, Thai was found to be similar to Telugu, which is explicable given that both languages encourage the use of deictic verbs in such contexts (Naidu et al. 2018). On the other hand, Telugu behaved rather like French in having relatively low proportions of Manner, in contrast to Swedish and Thai, as pointed out above.

With respect to the caused motion situations, it is hard to see any clear resemblance patterns across the four languages, but we can note individual languages standing out in one respect or another. Telugu differs from Thai and Swedish by having a higher proportion of Path in the caused-unbound (CU) than in caused-bound (CB) situation type, which may seem surprising, given the bounded semantics of Path (see Section 2). However, the finding can be explained by the fact that Telugu participants construed the *perceptually* unbound situations as *semantically* bound, in examples like that in (18).

- (18) *oka vyakti bamti-ni pai-ki visir-aa-du (Telugu)*
 one person.NOM ball-ACC above-DAT throw-PST-AGR
 Agent Figure Region-Path M+Cause
 ‘A person threw the ball up.’ (Literally: to the above) (Code: 202)

As pointed out earlier, Path is almost fully expressed by case in Telugu, and such expressions require a nominal. This however, does not need to be a Landmark expression, but could just as well be a Region noun as in (18). This helps explain the low proportion of the category Landmark in the Telugu data.

The complementary relationship between Path and Manner/Direction in the uncaused situations was not unexpected for a language such as French, given that Path verbs are more or less obligatory when boundaries are crossed, leaving Manner to be expressed in optional participles (e.g. Özcaliskan 2015). More interestingly, however, Path expression in French also lagged behind the other languages for the caused-bound (CB) condition. Rather than having Path expressions, as in the Swedish example (19), French speakers used descriptions like that in (20), expressing Cause, but not Path.

- (19) *En man sparka-de boll-en in i mål-et* (Swedish)
 INDEF man kick-PST ball-DEF in in goal-DEF
 Agent M+Cause Figure Path Region LM
 ‘A man kicked the ball into the goal.’

- (20) *Un monsieur qui lance un ballon*
 INDEF man REL throw.PRS INDEF ball
 Agent M+Cause Figure
sur un arbre (French)
 on INDEF tree
 Region LM
 ‘A man who throws a ball on a tree.’ (code 3481)

In sum, when comparing the four languages according to different situations types, the differences between them appear even greater, as similarities and differences criss-cross in ways that do not allow grouping two or three of the languages in any way. If we were forced to make a binary distinction, Thai could be said to pattern with Swedish on the basis of high Manner rate in the uncaused situations, and perhaps also the high rates of Direction in the caused-unbound (CU) situation type. But this would disregard the differences between Thai and Swedish in the bound situations (both uncaused and caused), where the Direction rates

for Swedish drop, but for Thai do not. The difference between the other pair of so-called “verb-framed” languages, French and Telugu, are even more extensive, with higher rates of Path and Direction in Telugu than in French, and conversely higher rates of Landmark expression in French than in Thai.

It is further not possible to formulate a single “scale” of variance along which to align the languages. Let us say that we attempt to do so by estimating in how many cases for each of the six categories in the four event types the proportion is above a certain threshold. A cut-off point at 70% would give a cline of “motion semantic density” consisting of Thai (12) > Swedish (9) > French (6) > Telugu (5). This, however, is a rather unenlightening measure, since it does not even consider *how* these categories are expressed. We turn to this question in the following subsection.

Table 8. Form-class to semantic category relations: The extent to which the total sum was higher than 1.00 corresponds to the degree to which the category was distributed in the clause (*distribution rate*) for each language, e.g. 27%, 10%, 28% and 3% (when rounding off) for the category Path.

		Swedish	French	Thai	Telugu
Path	V	0.009	0.786	0.795	0.030
	ADV	0.513	0.004	0.000	0.000
	PREP	0.745	0.313	0.486	0.000
	C	0.000	0.000	0.000	0.998
		1.268	1.103	1.281	1.028
Direction	V	0.172	0.844	1.000	0.998
	N	0.000	0.160	0.000	0.002
	ADV	0.805	0.013	0.000	0.000
	PREP	0.056	0.004	0.000	0.000
		1.033	1.021	1.000	1.000
Region	V	0.000	0.321	0.510	0.000
	N	0.008	0.089	0.107	0.996
	ADV	0.645	0.030	0.043	0.000
	PREP	0.717	0.747	0.484	0.004
		1.370	1.187	1.144	1.000
Landmark	N	0.959	0.952	0.982	1.000
	PRON	0.047	0.112	0.018	0.000
		1.006	1.064	1.000	1.000
Manner	V	0.996	0.861	0.992	0.944
	N	0.006	0.051	0.033	0.022
	ADJ	0.002	0.009	0.002	0.000
	ADV	0.124	0.111	0.061	0.156
		1.128	1.032	1.088	1.122
Cause	V	0.994	1.000	1.000	1.000
	N	0.006	0.000	0.000	0.000
		1.000	1.000	1.000	1.000

4.3. Conflation and distribution patterns

The quantitative comparison between the languages was so far performed purely semantically, without considering the form classes used. Table 8 shows the main form classes through which the six semantic categories were represented, with the sums of the proportions given in bold. Sums that are larger than 1.00 indicate that the category was distributed over more than one form class (see Section 2), which we refer to as *distribution rate*.

When considering the results from Table 8, the differences between the four languages become even more striking. Starting from the expression of Path, the main criterion for the Talmian binary typology, we can see at least three distinct patterns:

- (1) Swedish, which expresses Path in adverbs (ADV), which were mostly particles (PRT), as well as prepositions (PREP), and in nearly 27% of all clauses this was done in a distributed manner, as illustrated in (21);
- (2) French and Thai, which engage verbs (V) and prepositions (PREP), but with a much higher distribution rate in Thai than French (28% vs. 10%);
- (3) Telugu, with almost complete localization of Path to case (C).

- (21) *En man sprang ut*
INDEF man run.PST out
 Figure M+Manner Path+Region
ur ett förråd (Swedish)
out.of INDEF storehouse
 Path+Region LM
 ‘A man ran out of a storehouse.’(Code: 2910)

With respect to Direction, all languages showed very low distribution rates, demonstrating once again that the category behaves differently from Path, with which it is theoretically “conflated” in large parts of the literature. As for how the languages grouped for its expression, we can also notice three patterns, but different ones from the groupings for Path:

- (1) Expressed only in verbs (V): Telugu and Thai;
- (2) Expressed predominantly in verbs, but also in nouns (N) like *gauche* (‘left’): French;
- (3) Expressed mostly in adverbs (ADV): Swedish.

With respect to Region, Thai and French appear to behave similarly (as was the case for Path), involving verbs, prepositions, and to some degree also nouns and adverbs. But for Thai, the dominant form class was that of verbs

(51%), while for French it was prepositions (75%). Swedish divided Region expressions almost evenly between adverbs and prepositions (as in 21), and in 37% cases in both. Telugu, on the other hand, almost completely localized Region in nouns.

The expression of Landmark was largely similar across the four languages, predominantly through nouns, but here Swedish and French patterned together, with sizable use of pronouns, unlike Thai and Telugu, possibly due to more use of anaphora in the first two languages. Finally, there were no differences for Cause, and only minor ones for Manner, with higher rates of distribution (in verbs and adverbs) in Swedish and Telugu (ca. 12%) than in French and Thai.

5. General discussion

Based on the findings reported in the previous section, we can state that the general hypothesis motivating the study was confirmed: Swedish, French, Thai and Telugu pattern differently, (a) when considering all translocative motion descriptions together as shown in Section 4.1, (b) when we consider the four motion situations types separately (4.2), and (c) when considering the means through which the key semantic categories are expressed, the form-class to category mappings (4.3). On occasions, we could discern two or three of the languages showing resemblances; but as soon as the basis for classification changed, the languages patterned differently. Thus, there simply is no binary (or ternary) scale along which the four languages can be placed, and we cannot avoid the conclusion that *post-Talmian motion event typology should operate with at least four language types*, represented by the languages in our sample: Swedish, French, Thai and Telugu.

Of course, the four languages were far from “randomly” chosen, as previous research, summarized in the first two sections, had already indicated the existence of these four typological clusters. Let us consider the structural features of each of the languages, which can help explain their differences in the expression of motion event semantics, and possibly allow us to predict other languages that would pattern along with them. In referring to the *prominence* of a given semantic category below, we mean the rate to which it was expressed in all translocative clauses, according to the estimates shown in Figure 2, but modulated by the results for different situation types in Table 6 in the previous section. Following Table 5, we refer to general rates over 50% as “high” prominence.

Thai was found to be the most prominent in terms of Direction among the four languages. In this language, speakers expressed Direction exclusively through verbs, and the majority of these were Viewpoint-centred: deictic verbs, as in (16). This high degree of Direction prominence can be naturally explained by the fact that Thai is a serial-verb language, and such languages

regularly have a dedicated “slot” for deictic verbs (e.g. Fortis and Vittrant 2016). Thus, we could expect other serial-verb languages to be similarly Direction-prominent.

Telugu was suggested by Naidu et al. (2018) to be in general Region-prominent due to its structural feature of locative nouns, as displayed in (18). The results of the present study to some degree support this, but it was only for the caused-unbound (CU) situation type that Telugu dominated over the other three languages in this respect (see Table 6). Considering the uncaused-unbound (UU) situation type, we can note that Swedish had a much higher rate of Region-per-clause expression. How could we explain this? A possible pattern emerges if we consider that in the expression of uncaused-unbound (UU) situations, the rate of Path expression in Telugu was also lower than that in the other situation types for the same language (see Table 6). This makes sense, given that in Telugu (a) Path and Region pattern together, (b) case usually expresses Path, (c) case marking requires nouns to “attach” to as in (18), and (d) Region is nearly always expressed nominally (see Table 8). Thus, we could tentatively predict that other languages where Path is largely expressed through case, like Finnish, would belong to a similar cluster with relatively high Path and Region prominence, but not for uncaused-unbound (UU) situations, where Path and Region are likely to be demoted, while Direction is promoted.

Swedish and Thai were found to be both highly prominent with respect to expression of Manner, and with the exception of Direction, these two languages were quite similar with respect to which semantic categories they expressed, as can be seen in Figure 2. However, when we examine *how* these categories were expressed, it was French rather than Swedish that Thai seemed to resemble the most (Table 8). This shows that one should proceed with care when making generalizations only on the basis of which form classes are predominantly involved in motion event semantics (as in Talmian typology), since Thai and French differ both structurally and semantically with respect to motion semantics, as the discussions above concerning Direction and Manner clearly show.

Finally, a noteworthy and possibly generalizable finding in our study was that French, the most typical “verb-framed language” in our sample in Talmian terms, was *not* found to be prominent in terms of Path expression, and in fact lagged behind the other three languages in this respect (see Figure 2). This fact alone can serve as a corrective to the tendency to assume that if a language commonly expresses Path through verbs (in uncaused situations), it will be Path-prominent, since verbs are the central and obligatory component of a clause. In fact, the French speakers in our study frequently expressed Path only in the uncaused-bound (UB) motion situation type (Table 6), a type that is often taken to be “prototypical” in motion event semantics. The implication from these findings is that French may

indeed belong to a separate cluster that is distinct from the other three outlined above (i.e. those represented by Swedish, Thai and Telugu), along with other Romance languages like Spanish (Slobin 2004), but that this can be concluded only after examining all different kinds of motion situation types.

6. Conclusions

The main goal of the study reported in this article was to examine the proposal for four distinct typological clusters in motion event semantics (Naidu et al. 2018). We may conclude by stating that we have fulfilled this objective by demonstrating (beyond any reasonable doubt) that Swedish, French, Thai and Telugu motion event descriptions differ from one another to such an extent that each language can be seen as instantiating a distinct typological cluster. Further, we provided some possible explanations of what the differences between the languages depended on, focusing on structural properties of the languages, and predicted other similar languages to fall within, or close to, these patterns. We should note, however, that we are by no means claiming that the “four types” that are here proposed are to be seen as exclusive. As reviewed in Section 2, previous work using the theoretical framework of Holistic Spatial Semantics, and a somewhat similar elicitation method (Ishibashi et al. 2006), found that German motion-event descriptions were more similar to French than to Swedish (contrary to what could be expected based on genealogy), while Polish differed from the other five languages not only because it was the only Slavic language in the sample, but because it used Viewpoint-centred FoR much less often, in lacking deictic verbs. Thus, it remains an open question for future research to establish what other typological patterns in motion expressions will be established, and if some languages may be characterized as “hybrids” falling between a set of typological prototypes. This is one of the many exciting questions that are open for post-Talmian motion semantics.

What our study can be said to have contributed to this field, apart from the specific empirical findings, is to demonstrate some of the principles that future research in motion typology should abide by. As pointed out at the onset, the first and foremost desideratum is the need for clear theoretical and operational definitions of the key concepts. As argued in Section 2, it was necessary to carefully define concepts such as *translocation*, and to operationalize it in clear way so that we could delineate the data that is to be compared. Other methodological steps concerned defining the units of analysis, such as *descriptions* and *clauses*, and making such definitions both cross-linguistically comparable, and sensitive to the properties of individual languages (see Section 3). But perhaps most important is the need to define unambiguously semantic categories such as Path, Direction, Manner and

Cause, which has not always been the case, resulting in much cross-talk in motion typology (e.g. Imbert 2012).

By using a theoretical framework that has paid much attention to such definitional and methodological issues like Holistic Spatial Semantics (Zlatev 1997; Blomberg 2014), we have exemplified some key conceptual distinctions which further research should take into consideration. One is the distinction between Path (semantically bound translocation) coded by expressions like *to* and *from*, and Direction (semantically unbound translocation) coded by expressions like *up*, *down* and *come*, in English. As shown in Sections 4 and 5, making this distinction was essential for accounting for the differences between, for example, Path expression in French and the other three languages, or the unusually high level of Direction-expression in Thai. For present purposes, we did not distinguish between different kinds of Direction, in particular between Viewpoint-based (deictic) and Geocentric, but both our theoretical model, and the coding scheme used, allow for this to be carried out in a future analysis.

Another crucial point emphasised by our model and analysis was the need to distinguish between different kinds of motion situations (events), as different patterns of similarities and differences are found when comparing languages within different situation types (see Section 4.2). Others have made similar points, focusing however, more on *linguistic* construction types (e.g. Croft et al. 2010; Matsumoto 2020). While there is bound to be a correlation between one and the other, i.e., the situation types and construction (types), *the relation between them is never one-to-one*. This is the final point that we wish here to stress, since we feel that there is persistent confusion between the two, given the tendency of many in cognitive linguistics to conflate pre-linguistic and linguistic construal (cf. Blomberg and Zlatev 2014; Zlatev 2016).

It is for this reason that, in line with the convention in Holistic Spatial Semantics (Zlatev 1997), we have consistently used initial *capital* letters for linguistic semantic categories (e.g. Path, Manner, Cause) and lower case letters for non-linguistic ones (e.g. bound, unbound, caused, uncaused). While our elicitation tool was designed in terms of the latter, we noted many cases where speakers (and patterns characteristic for languages) did *not* construe one kind of situation with the corresponding type of semantics. To take one example, we showed in Section 4 that the expression of Manner and Cause varied quite consistently, with uncaused events attracting Manner expressions, and caused events predominantly Cause expressions. But the correlation was never full, and in some cases even non-existent, with Swedish and Thai participants expressing Manner in high proportions also to describe caused motion situations. Another example that we noted was the tendency for Telugu speakers to construe uncaused-unbound (UU) situations in the stimuli as linguistically bound, possibly conditioned by the structural properties of their language. This may – or may not – have

implications for linguistic relativity research, but we cannot even begin to ask such questions systematically if we do not de-conflate perceptual and semantic levels of meaning. We offer this important theoretical conclusion as our final contribution to post-Talmian motion event typology.

Abbreviations

ACC:	Accusative
ADV:	Adverb
AGR:	Agreement
AUX:	Auxiliary
C:	Case
CB:	Caused-bound
CU:	Caused-unbound
DAT:	Dative
DEF:	Definite
FoR:	Frame of Reference
GC:	Geocentric
INDEF:	Indefinite
LM:	Landmark
M:	Motion
N:	Noun
NOM:	Nominative
NP:	Noun phrase
OC:	Object-centred
POSS:	Possessive
PREP:	Preposition
PRON:	Pronoun
PRS:	Present tense
PRT:	Particle
PST:	Past tense
PTCP:	Participle
UB:	Uncaused-bound
UU:	Uncaused-unbound
V:	Verb
VC:	Viewpoint-centred

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Appendix

A description of the 52 stimuli of the elicitation tool used in the study, divided along the 8 motion situation types, defined by the three parameters translocation (T), boundedness (B) and causation (CAUSED).

T	B	CAUSED–	CAUSED+
+	+	1.1 Man Walks Into Garage (Orthogonal)	2.1 Boy Throws Ball To Tree. (Orthogonal)
		1.2 Woman Walks Out of Hut (Orthogonal)	2.2 Man Kicks Ball To Bench (Orthogonal)
		1.3 Girl Rushes Into Hut (Orthogonal)	2.3 Woman Throws Ball From Tree (Parallel)
		1.4 Boy Rushes Out of Garage (Orthogonal)	2.4 Girl Kicks Ball From Bench (Parallel)
		1.5 Boy Walks Into Room (Parallel-Inside)	2.5 Girl Takes Cat Out of Car (Parallel)
		1.6 Girl Walks Out of Room (Parallel-Inside)	2.6 Woman Takes Cat Out of Car (Orthogonal)
		1.7 Man Walks Into Room (Parallel-Outside)	2.7 Boy Puts Cat Into Car (Orthogonal)
		1.8 Woman Walks Out of Room (Parallel-Outside)	2.8 Man Puts Cat Into Car (Parallel)
		1.9 Man Runs To Tree (Orthogonal)	
		1.10 Woman Runs From Tree (Orthogonal)	
		1.11 Boy Hops To Tree (Orthogonal)	
		1.12 Girl Hops From Tree (Orthogonal)	
+	–	3.1 Boy Climbs Up Cliff (Orthogonal)	4.1 Man Throws Ball Up (Orthogonal)
		3.2 Boy Climbs Down a Tree (Orthogonal)	4.2 Girl Throws Ball Down (from Cliff) (Orthogonal)
		3.3 Man Runs Up Hill (Orthogonal)	4.3 Boy Rolls the Toy Car Away (Orthogonal)
		3.4 Girl Runs Down Hill (Orthogonal)	4.4 Girl Rolls the Toy Car Towards (Parallel-figure side)
		3.5 Girl Walks Up Hill From the Lake (Parallel) (camera at the top)	4.5 Woman makes Dog Come to Her (Parallel-figure side)
		3.6 Boy Walks Down Hill Toward the Lake (Parallel) (camera at the top)	4.6 Man Makes Dog Come to Him (Parallel-actor side)
		3.7 Man Walks Down Hill (Parallel) (camera at the bottom)	
		3.8 Woman Walks Up Hill (Parallel) (camera at the bottom)	
		3.9 Boy Runs Winds Away (Parallel)	
		3.10 Man Runs Winds Toward (Parallel)	
		3.11 Man Runs Straight Away (Parallel)	
		3.12 Woman Runs Straight Toward (Parallel)	
–	+	5.1 Girl Turns Around 360 degrees (Orthogonal)	6.1 Man Breaks Bottle with Hammer (Orthogonal)
		5.2 Man Stands from Sitting (Orthogonal)	6.2 Woman Tears Paper apart (Orthogonal)
		5.3 Woman Sits from Standing (Orthogonal)	
		5.4 Boy Does Somersault (Orthogonal)	
–	–	7.1 Man Jumping on Trampoline (Orthogonal)	8.1 Man Blowing up Balloon (Orthogonal)
		7.2 Boy Doing Jumping Jacks (Orthogonal)	8.2 Woman Shaking Cloth (Orthogonal)
		7.3 Man Jogging in Park (Orthogonal)	8.3 Woman Spinning Globe (Orthogonal)
		7.4 Woman Strolling in Park (Orthogonal)	8.4 Girl Making Doll Dance (Orthogonal)