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Lab

Dynamic Event Types and Profiling in Motion Frames

Towards a frame-semantic account of the diversity of motion expressions

Michael Herweg

Heidelberg, HULC Lab Day, 11-05-2017

Objectives

- To develop a semantic framework
  - that may account for the diversity of motion expressions within a language and across typologically distinct languages
  - that provides a unified format to accommodate relevant concepts from both theoretical and cognitive linguistics, as well as to represent findings from experimental psycholinguistic research
  - whose elements are well-defined via their foundation in logic-based spatio-temporal model structures (vs. mere 'markerese')

HULC Lab Research Group „Time and Space in Language and Cognition“

Project:

„A case for semantic underspecification? The representation of aspectual class information for motion verbs and directional prepositions“

(Johannes Gerwien & Michael Herweg)

The semantic framework

FAMEu – A **F**rame-Semantic **A**ccount of **M**otion **E**xpressions with **U**nderspecification

- provenance: Barsalou-Düsseldorf frames (Barsalou 1992; [DFG CRC 991:] Löbner 2013, Gamerschlag et al. 2014)
  - frames as the basic format in which the mind organizes concepts to represent the categories of things and phenomena in the world
  - formally: typed attribute-value structures with structural invariants and different sorts of constraints
  - here enhanced with weight assignments to values of attributes and their propagation through a frame structure
- key elements of the FAMEu *locomotion* frame:
  - 2 event layers (cf. Gerwien & von Stutterheim 2016) enriched with elaborate manner and path sub-structures
  - a 3-partite situation-structure concept (Phase Arrays, cf. Herweg 2014) to represent - possibly underspecified - aspectual class contribution and composition
  - Profiling: Selection, deselection and augmentation of frame elements
  - Dynamic Semantics for path and aspectual class construal

The basic FAMEu *locomotion* frame

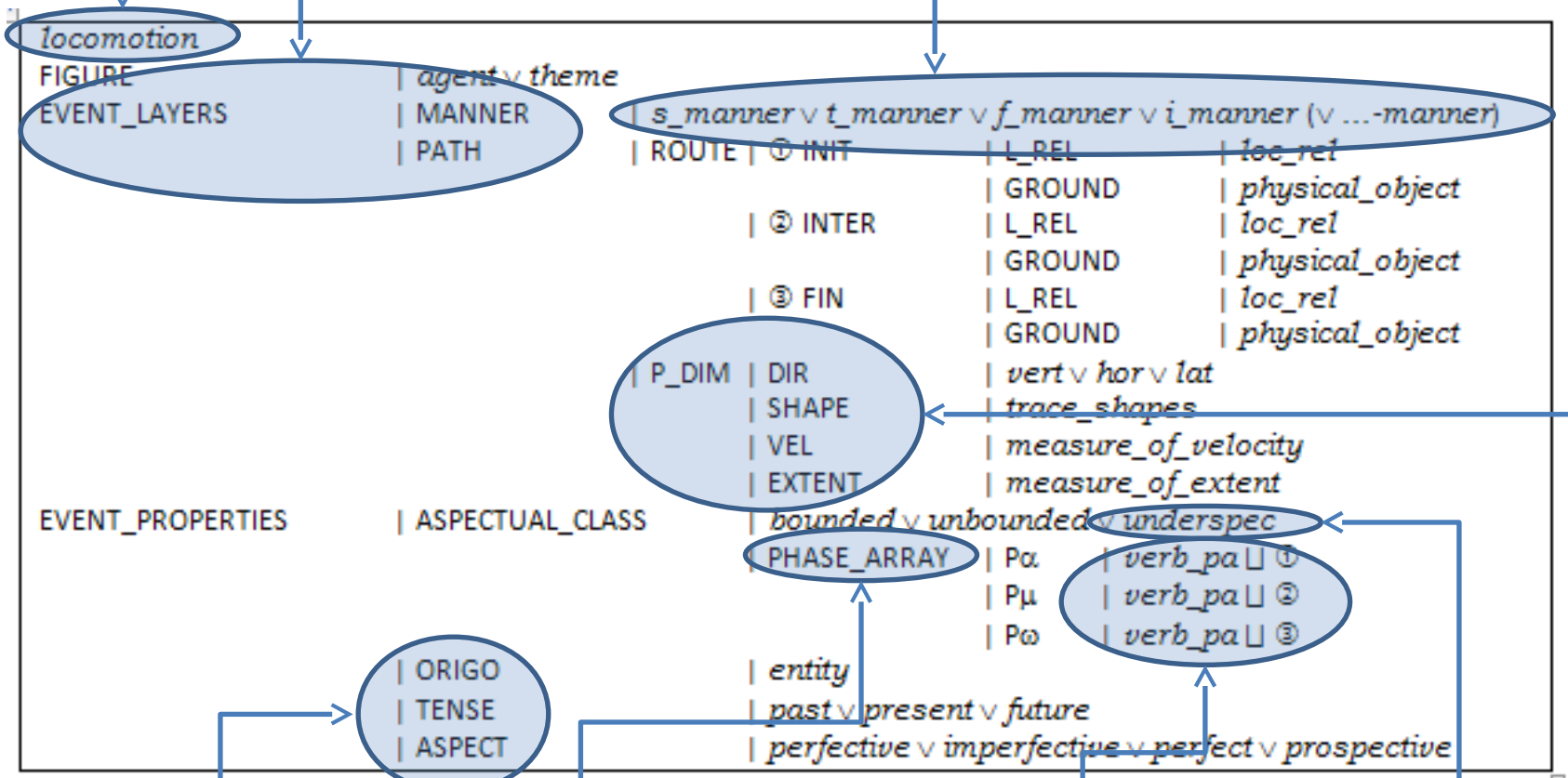
locomotion						
FIGURE	| *agent* ∨ *theme*					
EVENT_LAYERS	| MANNER	| *s_manner* ∨ *t_manner* ∨ *f_manner* ∨ *i_manner* (∨ …-*manner*)				
	| PATH	| ROUTE	| ① INIT	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
			| ② INTER	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
			| ③ FIN	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
		| P_DIM	| DIR	| *vert* ∨ *hor* ∨ *lat*	
			| SHAPE	| *trace_shapes*	
			| VEL	| *measure_of_velocity*	
			| EXTENT	| *measure_of_extent*	
EVENT_PROPERTIES	| ASPECTUAL_CLASS		| *bounded* ∨ *unbounded* ∨ *underspec*		
			| PHASE_ARRAY	| Pα	| *verb_pa* ⊔ ①
				| Pμ	| *verb_pa* ⊔ ②
				| Pω	| *verb_pa* ⊔ ③
	| ORIGO		| *entity*		
	| TENSE		| *past* ∨ *present* ∨ *future*		
	| ASPECT		| *perfective* ∨ *imperfective* ∨ *perfect* ∨ *prospective*		

System of verbal sub-types of the *locomotion* type accounts for semantic varietes of motion verbs (e.g., path- generating vs. non-path-generating verbs)

Specific Profiling patterns of elements of PATH and MANNER event layers represent typological diversity (path- vs. manner-focussing languages and varieties thereof).

fine-grained distinctions of types of manner-of-motion

differentiation among path expressions via 4-dimensional path scheme



aspectual and indexical perspectives on event representation

Interpretation of PHASE_ARRAY attribute values in terms of Dynamic Logic (DITL) provides dynamic foundation of intrinsically static frame structures

integrated representation of aspectual class contribution of motion verbs and their directional complements

explicit account of aspectual class underspecification

- System of verbal sub-types of the *locomotion* type accounts for semantic varietes of motion verbs (e.g., path- generating vs. non-path-generating verbs)

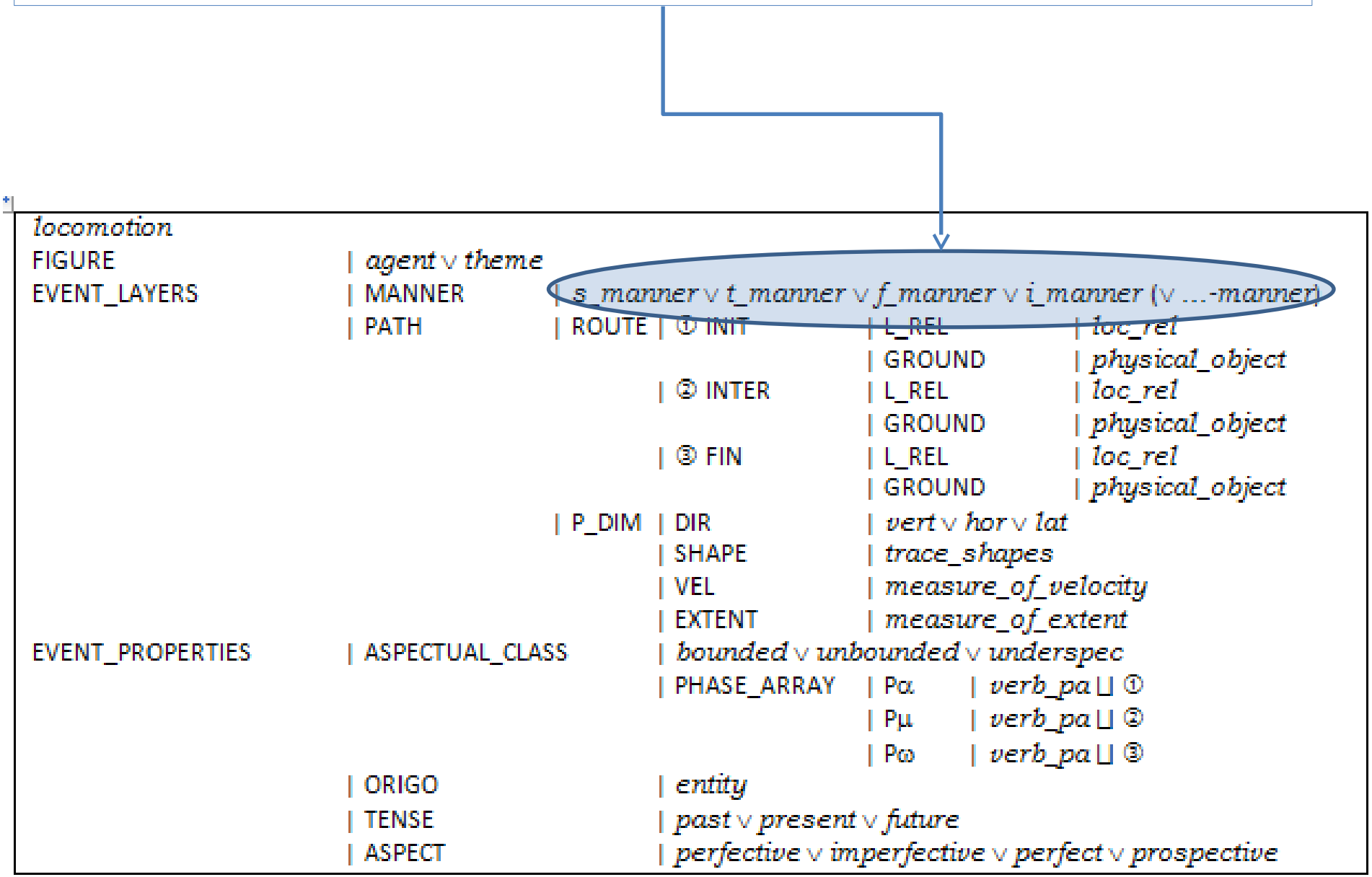
locomotion

FIGURE		*agent* ∨ *theme*			
EVENT_LAYERS	MANNER	*s_manner* ∨ *t_manner* ∨ *f_manner* ∨ *i_manner* (∨ …-*manner*)			
	PATH	ROUTE	① INIT	L_REL	*loc_rel*
				GROUND	*physical_object*
			② INTER	L_REL	*loc_rel*
				GROUND	*physical_object*
			③ FIN	L_REL	*loc_rel*
				GROUND	*physical_object*
		P_DIM	DIR	*vert* ∨ *hor* ∨ *lat*	
			SHAPE	*trace_shapes*	
			VEL	*measure_of_velocity*	
			EXTENT	*measure_of_extent*	
EVENT_PROPERTIES	ASPECTUAL_CLASS		*bounded* ∨ *unbounded* ∨ *underspec*		
			PHASE_ARRAY	Pα	*verb_pa* ⊔ ①
				Pμ	*verb_pa* ⊔ ②
				Pω	*verb_pa* ⊔ ③
	ORIGO		*entity*		
	TENSE		*past* ∨ *present* ∨ *future*		
	ASPECT		*perfective* ∨ *imperfective* ∨ *perfect* ∨ *prospective*		

- Specific Profiling patterns of elements of PATH and MANNER event layers represent typological diversity (path- vs. manner- focussing languages and varieties thereof).

locomotion					
FIGURE	| *agent* ∨ *theme*				
EVENT_LAYERS	| MANNER	| *s_manner* ∨ *t_manner* ∨ *f_manner* ∨ *i_manner* (∨ …-*manner*)			
	| PATH	| ROUTE	| ① INIT	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
			| ② INTER	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
			| ③ FIN	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
		| P_DIM	| DIR	| *vert* ∨ *hor* ∨ *lat*	
			| SHAPE	| *trace_shapes*	
			| VEL	| *measure_of_velocity*	
			| EXTENT	| *measure_of_extent*	
EVENT_PROPERTIES	| ASPECTUAL_CLASS		| *bounded* ∨ *unbounded* ∨ *underspec*		
			| PHASE_ARRAY	| Pα	| *verb_pa* ⊔ ①
				| Pμ	| *verb_pa* ⊔ ②
				| Pω	| *verb_pa* ⊔ ③
	| ORIGO		| *entity*		
	| TENSE		| *past* ∨ *present* ∨ *future*		
	| ASPECT		| *perfective* ∨ *imperfective* ∨ *perfect* ∨ *prospective*		

- Fine-grained distinctions of types of manner-of-motion



locomotion						
FIGURE	| *agent* ∨ *theme*					
EVENT_LAYERS	| MANNER	| *s_manner* ∨ *t_manner* ∨ *f_manner* ∨ *i_manner* (∨ …*-manner*)				
	| PATH	| ROUTE	| ① INIT	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
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				| GROUND	| *physical_object*
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		| P_DIM	| DIR	| *vert* ∨ *hor* ∨ *lat*	
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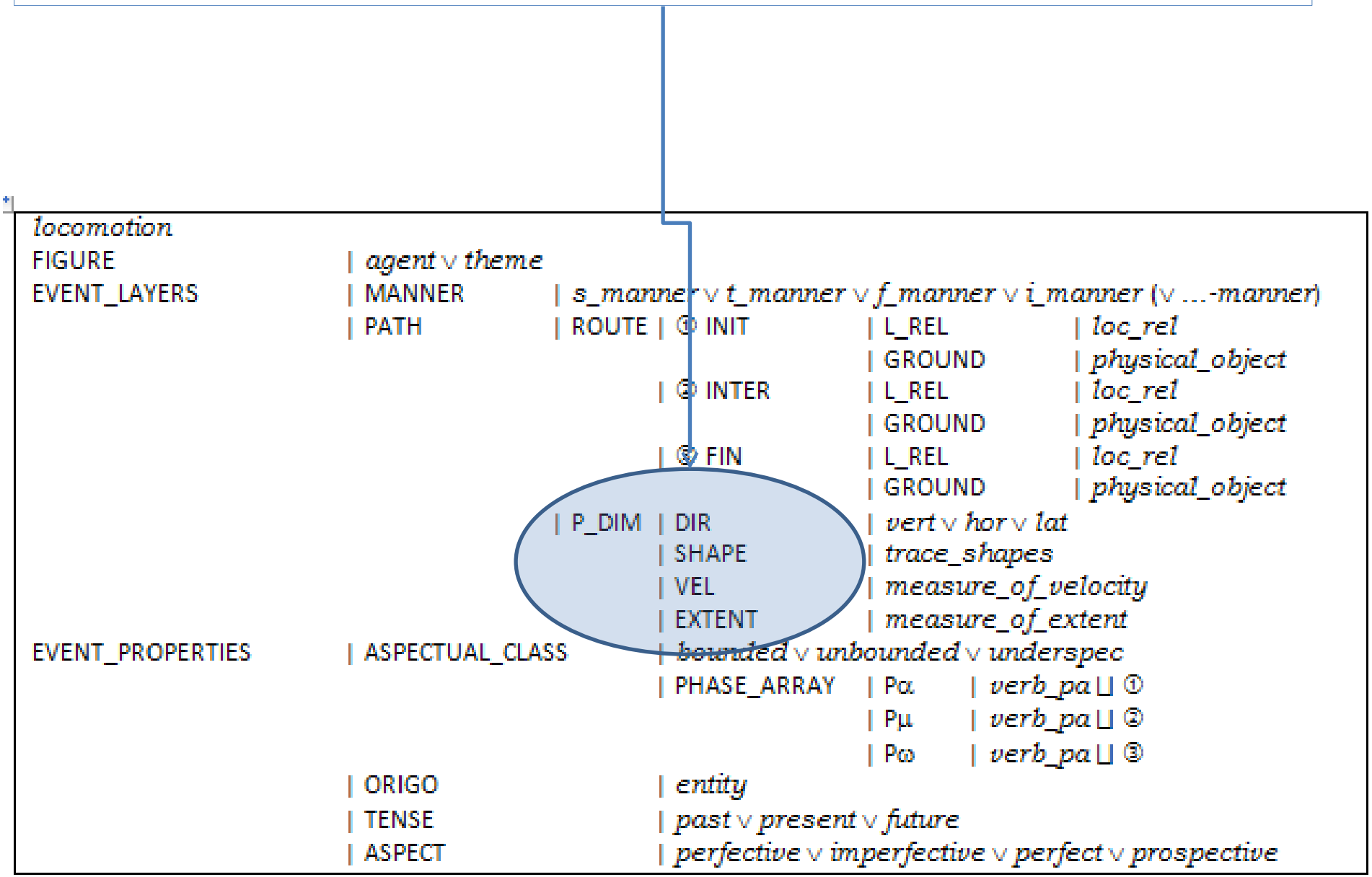
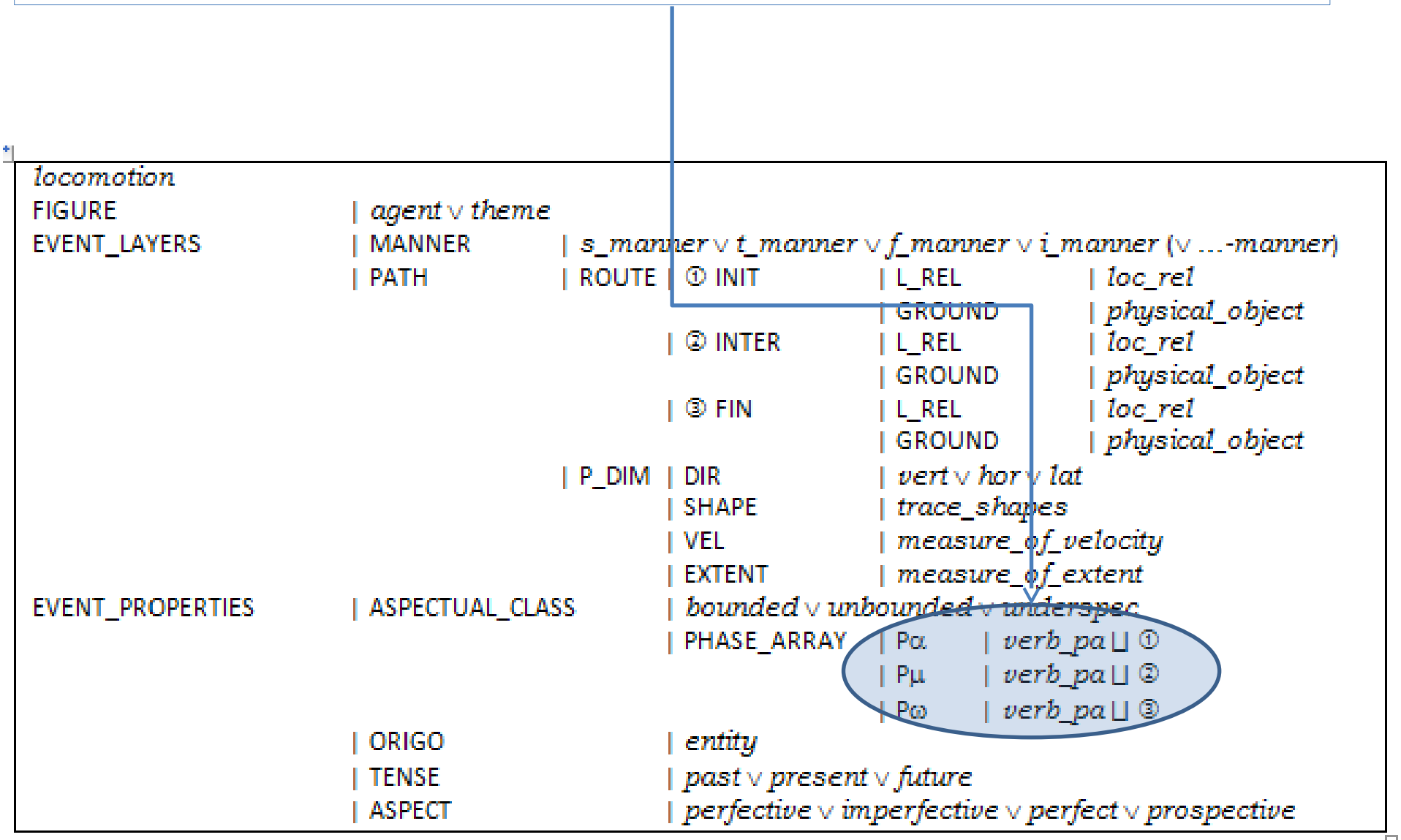
	| ASPECT		| *perfective* ∨ *imperfective* ∨ *perfect* ∨ *prospective*		

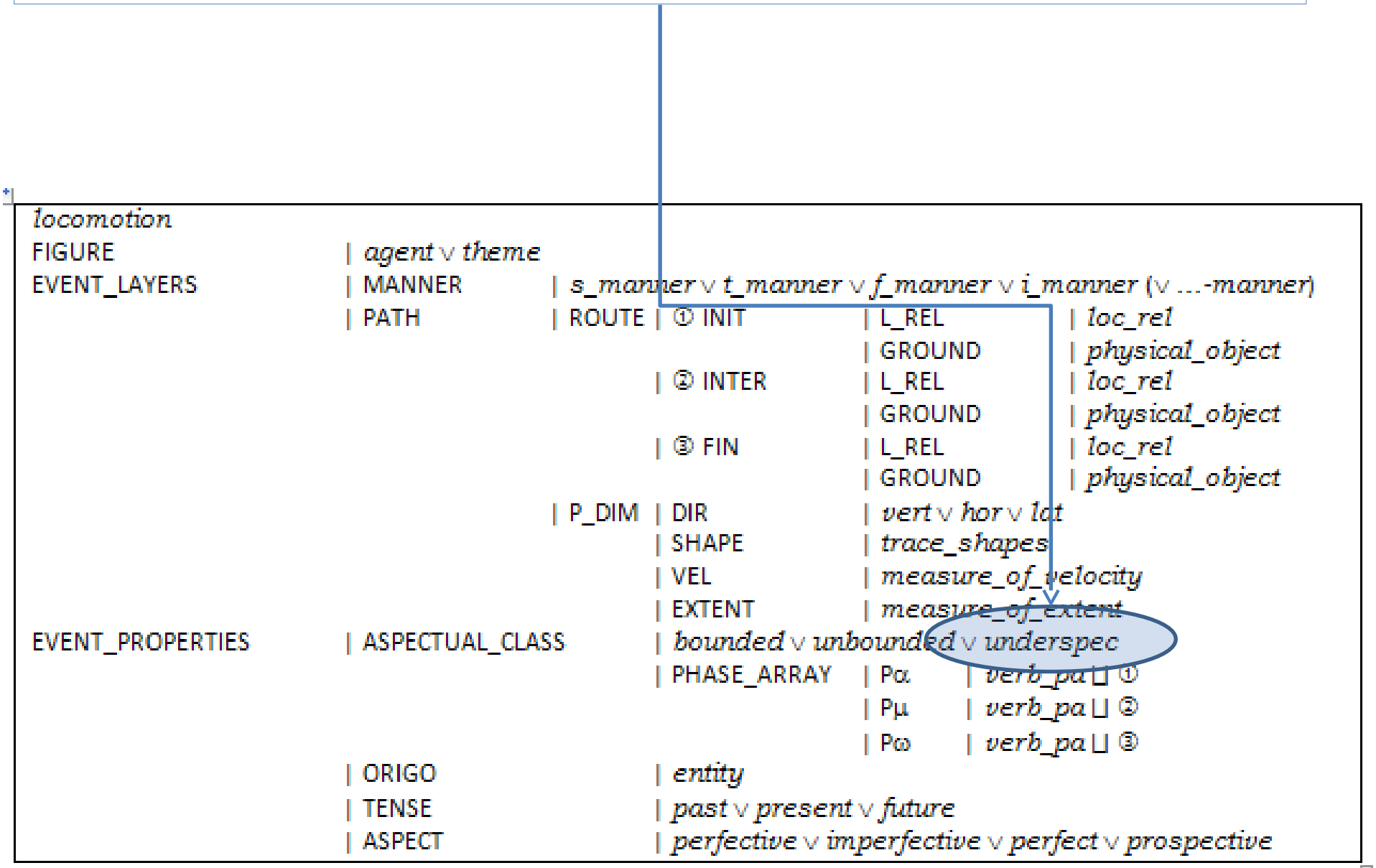
- Differentiation among path expressions via a 4-dimensional path scheme



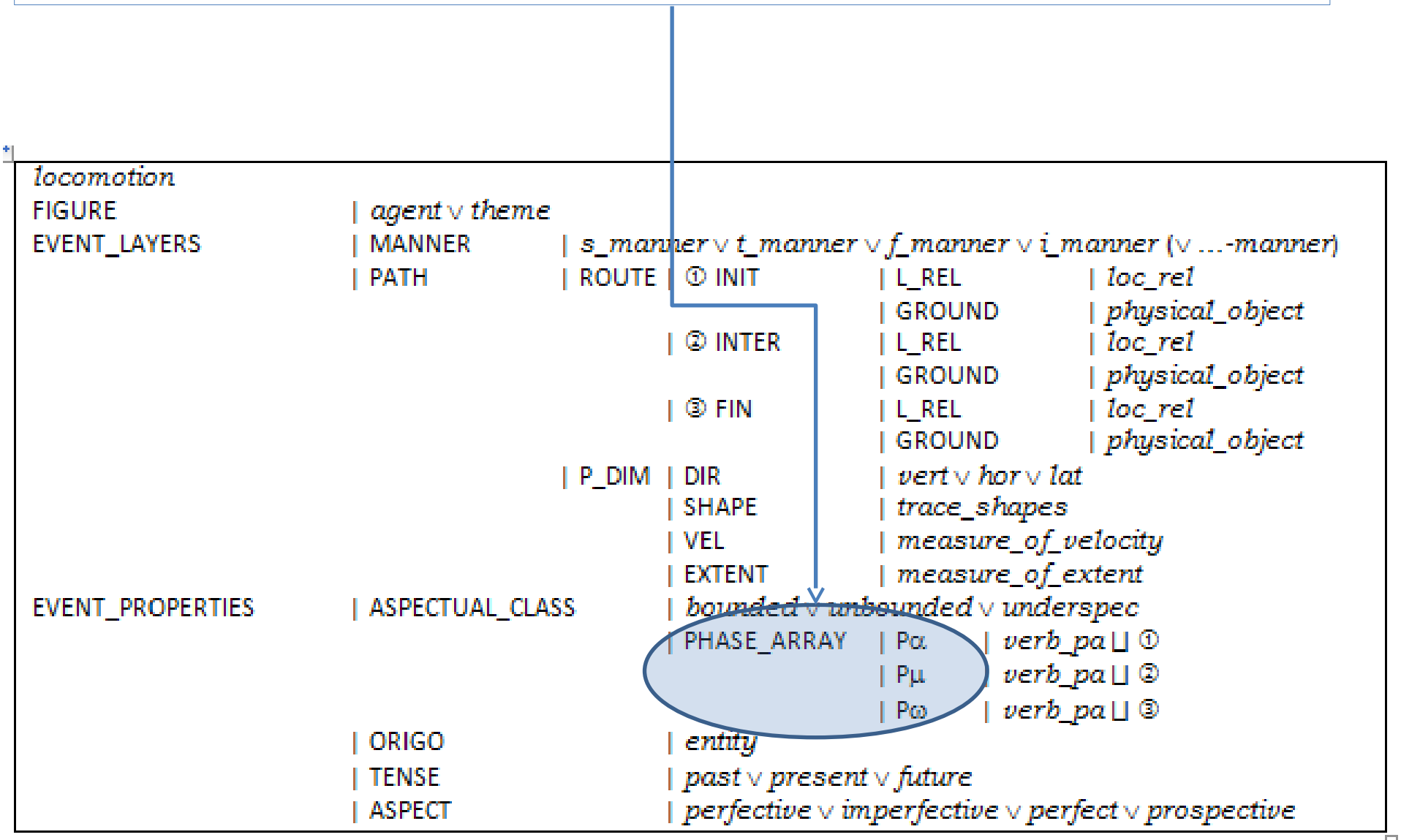
- Integrated representation of aspectual class contribution of motion verbs and their directional complements



- Explicit account of aspectual class underspecification



- Interpretation of PHASE_ARRAY attribute values in terms of Dynamic Logic (DITL) provides dynamic foundation of intrinsically static frame structures.



locomotion						
FIGURE	| *agent* ∨ *theme*					
EVENT_LAYERS	| MANNER	| *s_manner* ∨ *t_manner* ∨ *f_manner* ∨ *i_manner* (∨ …-*manner*)				
	| PATH	| ROUTE	① INIT	| L_REL	| *loc_rel*	
				| GROUND	| *physical_object*	
			② INTER	| L_REL	| *loc_rel*	
				| GROUND	| *physical_object*	
			③ FIN	| L_REL	| *loc_rel*	
				| GROUND	| *physical_object*	
		| P_DIM	| DIR	| *vert* ∨ *hor* ∨ *lat*		
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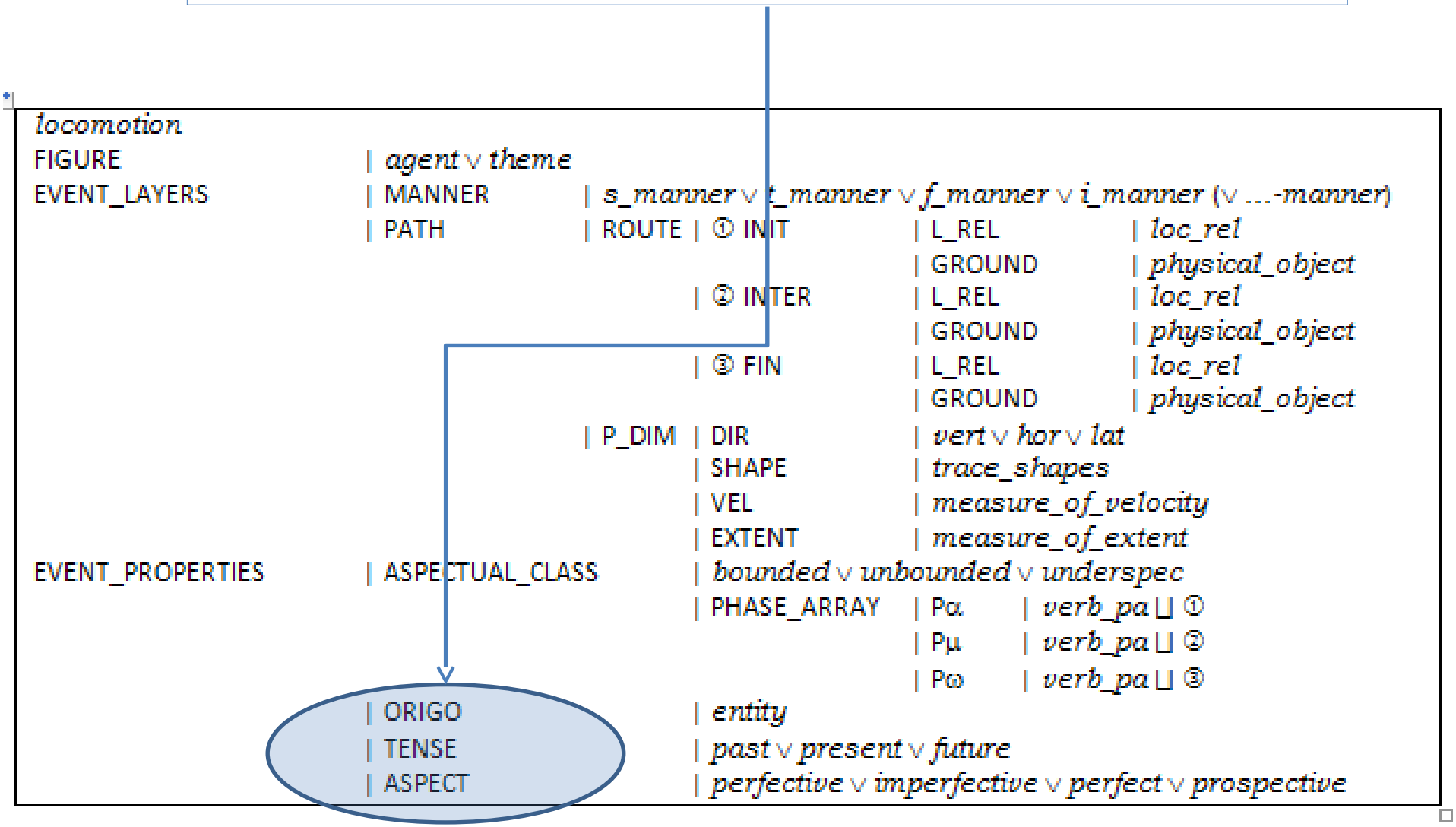
			| VEL	| *measure_of_velocity*		
			| EXTENT	| *measure_of_extent*		
EVENT_PROPERTIES	| ASPECTUAL_CLASS		| *bounded* ∨ *unbounded* ∨ *underspec*			
			| PHASE_ARRAY	| Pα	| *verb_pa* ⊔ ①	
				| Pμ	| *verb_pa* ⊔ ②	
				| Pω	| *verb_pa* ⊔ ③	
	| ORIGO		| *entity*			
	| TENSE		| *past* ∨ *present* ∨ *future*			
	| ASPECT		| *perfective* ∨ *imperfective* ∨ *perfect* ∨ *prospective*			

- Perspectives on event representation for viewpoint aspect and indexical anchoring in terms of tense and origo position (e.g. for deictic head verbs in SVCs).



- Assignment of weights to frame elements and their propagation via Dependency Constraints serve to model preferences in the construal of a conceptual interpretation, as evidenced from experimental and corpus-based research.

eilen

FIGURE	**AGENT**	**STATE_OF_MIND**	**"target-minded" [↑©1 w: 0.9]**		
EVENT_LAYERS	MANNER	**eilend** (< *t_manner & i_manner*)			
	PATH	ROUTE	① INIT	L_REL	**\across**
				GROUND	**d_hof**
			② INTER	L_REL	**across**
				GROUND	**d_hof**
			③ FIN	L_REL	**\across**
				GROUND	**d_hof**
		P_DIM	DIR	*vert ∨ hor ∨ lat*	
			SHAPE	*trace_shapes*	
			EXTENT	*measure_of_length*	
			VEL	*measure_of_velocity*	
EVENT_PROPERTIES	ASPECTUAL_CLASS	***bounded* [↓©1 w: 0.8]** ∨ *unbounded ∨ underspec*			
		PHASE_ARRAY	Pα	**\eilen** ⊔ ①	
			Pμ	**eilen** ⊔ ②	
			Pω	**\eilen** ⊔ ③	

Attributes, values and weights in this sample frame for *über den Hof eilen* 'hurry across the yard' just serve to illustrate the general approach

➔ *collect empirical evidence for interpretation preferences through experiments and corpus research*

Dynamic Event Types in FAMEu

- Dynamic foundation of intrinsically static frames via interpretation of PHASE_ARRAY values in a Dynamic Logic, namely a variant of Dynamic Interval Temporal Logic (DITL, Mani & Pustejovsky 2012)
- Definition of a system of verbal types based on DITL-like concepts
  - note: temporal progression is modelled here by forward-overlapping periods, using Allen's (1984) overlap relation 'o'

- **basic motion: type *move***

move(f, t) =df [loc(f, t1) = l1 $\Rightarrow$ loc(f, t2) = l2, t1 o t2, l1 ≠ l2]$^{+}$ for t1, t2 $\subset$ t

- **path-generating motion: type *move_p***

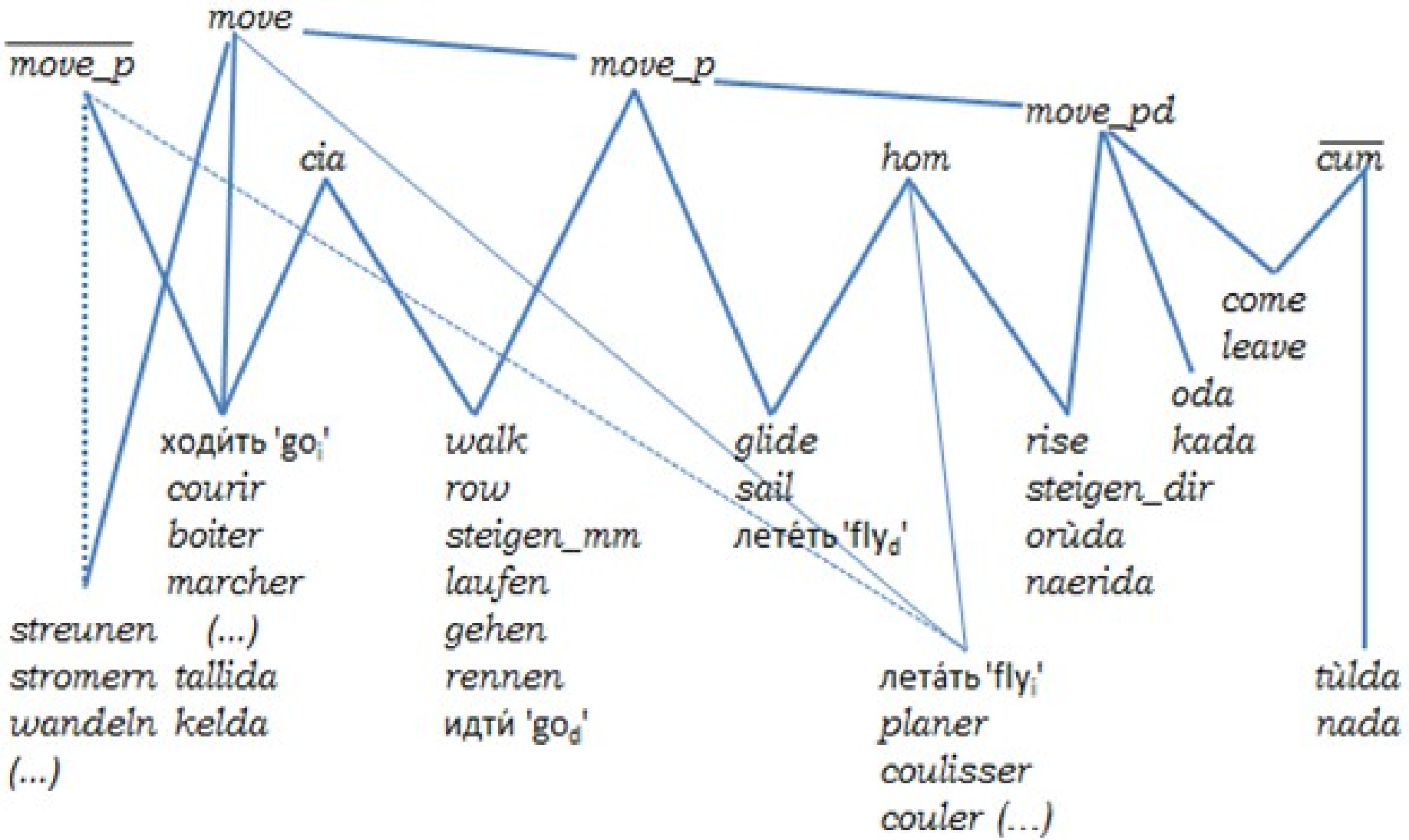
move_p(f, t) =df [loc(f, t1) = l1, p = <l1> $\Rightarrow$
loc(f, t2) = l2, p = <l1, l2> , t1 o t2, l1 ≠ l2]$^{+}$ for t1, t2 $\subset$ t

- **path-generating directed motion: type *move_pd***

move_pd(f, t) =df [loc(f, t1) = l1, l1 = b, p = <b> $\Rightarrow$
loc(f, t2) = l2, p = <b, l2> , t1 o t2, l1 ≠ l2, d(b, l1) < d(b, l2)]$^{+}$ for t1, t2 $\subset$ t

- a 2nd layer of verbal types: towards a representation of manners-of-motion
- types ***cia*** 'Cumulative Iteration of Atoms' and ***hom*** '(Non-Segmented) Homogeneous Process'

An Initial FAMEu System of Dynamic Event Types: examples from Russian, German, French and Korean



Rationale for type assignments: German and Russian

- German
  - Atelic motion verbs like *streunen* 'stray'*, stromern* 'roam'*, ...* (Maienborn 1991) resist time-span adverbials, ingressive ("source") and ingressive ("goal") PPs, and measures on paths.
  - Underspecified motion verbs like *laufen* 'walk, run', *rennen* 'run' etc. combine well with all types of AC-indicators (time-span and durational adverbials; ingressive, egressive, atelic and underspecified PPs; cf. Herweg 2014).
- Russian
  - Determinate motion verbs express (uni-)directional motion:
    - лете́ть 'fly' (one direction), идти́ 'go' (one direction)
  - Indeterminate motion verbs express non- or multi-directional motion
    - лета́ть 'fly' (non-/multi-directional), ходи́ть 'go' (non-/multi-directional)
      - Zinova & Osswald (2014):
        - Frames for determinate motion verbs include a 'path' attribute,
        - Frames for indeterminate motion verbs include only a 'trace' attribute

Rationale for type assignments: French and Korean

- French (cf. Beavers 2009, von Stutterheim & Gerwien 2016, 2017)
  - French manner-of-motion verbs like *courir* 'run'*, boiter* 'limp'*, couler* 'flow' etc. largely resist change-of-state PP complements, but accept General Delimiters (cf. Herweg 2017 on the semantic and pragmatic aspects of GDs)
- Korean (Zubizarreta & Oh 2007)
  - Perspectivizing Deictic Motion Verbs *kada* 'go' and *oda* 'come' predominantly serve as heads of SVCs that denote (perspectivized) directed motion.
  - Manner-of-motion verbs like *tallida* 'run' and *kelda* 'walk' in general appear only as modifiers in a SVC; if stand-alone, they resist change-of-state adjuncts, but accept GDs.
  - Type 1 path Vs *orùda* 'move up' and *naerida* 'move down' can appear as verbal heads that provide the path element in a motion expression.
  - Type 2 path Vs like *tùlda* 'move into', *nada* 'move out of' largely appear only as non-heads in a SVC. In these contexts they are pure change-of-state verbs with no motion component of their own.

Profiling in Cognitive Grammar and Frame Semantics

- Langacker's (1983, 1987 etc.) Cognitive Grammar:
  - The profile of a predication is a substructure of the conceptual base that has been raised to a special level of prominence and hence serves as the specific focus of attention.
  - Profiling is thus a means of assigning prominence to particular elements of a conceptual structure
- Gawron's (2011) Frame Semantics:
  - Profiling is a function which selects those parts of a frame that the verb highlights.
  - Profiling can at the same time enrich a frame and suppress parts of it.

Profiling in FAMEu

- Profiling in FAMEu:
  - Profiling is modelled by means of operations on frame attributes that are triggered by particular linguistic items, namely operations that
    - select, specify and expand frame attributes;
    - deselect or suppress frame attributes;
    - determine interrelations and dependencies between frame attributes.
  - This extended concept of profiling will be employed *inter alia* in order to
    - account for differences between manner-dominant and path-dominant motion verbs in terms of the event layers they select;
    - capture more fine-grained distinctions among both manner-dominant and path-dominant motion verbs by means of distinctions with regard to the particular sub-attributes they profile within the two layers;
    - diversify other attributes in the basic *locomotion* frame, such as the thematic role of the Figure (agentive, thematic) and its impact on dependent attributes such as the Figure's behaviour, intention, state of mind, etc.

Profiles for path-dominant verbs - 1

- The profiles for path-dominant verbs select specific substructures of the PATH attribute and suppress the MANNER attribute.

sortir					
FIGURE	*agent*				
EVENT_LAYERS	PATH	ROUTE	①INIT	L_REL	in
				GROUND	*physical_object*
			②INTER	L_REL	~in
				GROUND	*physical_object*
EVENT_PROPERTIES	ASPECTUAL_CLASS		*bounded*		
			PHASE_ARRAY	Pα	①
				Pμ	②

The representation of the French path verb *sortir* in the *locomotion* frame

entrer / tùlda					
FIGURE	*agent*				
EVENT_LAYERS	PATH	ROUTE	②INTER	L_REL	~in
				GROUND	*physical_object*
			③FIN	L_REL	in
				GROUND	*physical_object*
EVENT_PROPERTIES	ASPECTUAL_CLASS		*bounded*		
			PHASE_ARRAY	Pμ	②
				Pω	③

The representation of the French path verb *entrer* in the *locomotion* frame

- similar semantics for Korean *nada* 'move out of' and Kor. *tùlda* 'move into' – however:
  - *nada* and *tùlda* do not on their own profile PATH | ROUTE but rather depend on the head verb of a serial verb construction to whose PATH | ROUTE profile they only add the change-of-state information ('in' to '~in' and '~in' to 'in', resp.)

Profiles for path-dominant verbs - 2

- The profiles for path-dominant verbs select specific substructures of the PATH attribute and suppress the MANNER attribute.

descendre						
FIGURE	***agent***					
EVENT_LAYERS	**PATH**	**ROUTE**	① INIT	L_REL	*loc_rel*	
				GROUND	*physical_object*	
			② INTER	L_REL	*loc_rel*	
				GROUND	*physical_object*	
			③ FIN	L_REL	*loc_rel*	
				GROUND	*physical_object*	
		P_DIM	**DIR**	***vert_down***		
EVENT_PROPERTIES	ASPECTUAL_CLASS		*underspec*			
			PHASE_ARRAY	Pα	\descendre ⊔ ①	
				Pμ	descendre ⊔ ②	
				Pω	\descendre ⊔ ③	

The representation of Fr. *descendre* in the *locomotion* frame (similar for Korean *naerida*)

Profiles for manner-dominant verbs I: non-path-generating manner-of-motion verbs

- Non-path-generating manner-of-motion verbs (FAMEu type *move* & $\overline{move\_p}$) profile the MANNER attribute and suppress the PATH attribute.
- Evidence for non-path-generating MoMVs in Korean:
  - Verbs like Kor. *tallida* and *kelda* cannot stand on their own, but require a deictic motion verb, i.e. *kada* 'go' or *oda* 'come', as head of a SVC in order to express the manner of a directed motion:

    John-i *kongwen-ey* *talli/kel-e-ka-ss-ta*

    John-Nom park-Loc run/walk-L-go-Past-Decl 'John ran/walked to the park'
  - Being dependent elements in SVCs, Kor. *tallida* and *kelda* also cannot on their own, i.e. without the support of a deictic motion verb, induce directional readings of locative phrases headed by the postposition *–ey*; cf. Zubizarreta & Oh (2007):

    **John-i* *kongwen-ey* *talli/kel-ess-ta*

    John-Nom park-Loc run/walk-Past-Decl 'John ran/walked to the park'
  - Zubizarreta & Oh (2007): Korean MoMVs are purely activity-denoting verbs which themselves do not encode any directed motion.

tallida				
FIGURE	| ***agent***			
EVENT_LAYERS	| **MANNER**	| **running_gait**		
EVENT_PROPERTIES	| ASPECTUAL_CLASS	| *underspec*		
		| PHASE_ARRAY	| Pα	| \run
			| Pμ	| run
			| Pω	| \run

The representation of the Korean pure manner-of-motion verb *tallida* in the *locomotion* frame

Profiles for manner-dominant verbs II: path-generating manner-of-motion verbs - 1

- The Profile of path-generating manner-of-motion verbs like *walk, run, laufen, rennen* (FAMEu type *move_p)* assigns primary focal prominence to the MANNER attribute and secondary focal prominence to the PATH attribute.

- Evidence for path-generating profile:

  - The MoMVs in question function as heads of VPs with directional complements (a) and can stand on their own in appropriate contexts (b), triggering the interpretation of the existence of a path which is made explicit by the measure phrase in (c):

    (a) *Lola ran around town, Lola rannte durch die Stadt*

    (b) *Lola was running, Lola rannte*

    (c) *Lola ran two miles, Lola rannte zwei km*

Profiles for manner-dominant verbs II: path-generating manner-of-motion verbs - 2

- Evidence for different levels of focal prominence:
  - Manner is the verb's distinctive meaning contribution, because
    - the verbs in question cover a multitude of fine-grained manner distinctions, each of which is in contrast to a multitude of competing manner: *Walk, don't run!*.
    - verb-specific manners can be further specified by manner adverbs like in *walk slowly/quickly/sluggishly/...*, which yields an even more detailled system of manner elaborations.
  - The path element has a secondary status in the profiles of the verbs in question, because
    - properties of the path are distinctive semantic features only for very few manner-of-motion verbs:
      - *meander, wind* (shape) - *wade* (texture) - *rise, plunge*, *plummet* (direction)
      - the meanings of the vast majority of manner-of-motion verbs do not incorporate any characteristics of the path. Properties of the path are rather specified by elements which are structurally dependent on the verb, such as directional complements (*run through the jungle*) and adjuncts (*run in circles, run backward/upward*).

Profiles for manner-dominant verbs II: path-generating manner-of-motion verbs - 3

- The Profile of path-generating manner-of-motion verbs like *walk, run, laufen, rennen* (FAMEu type *move_p)* assigns **primary focal prominence** to the MANNER attribute and secondary focal prominence to the PATH attribute.

walk						
FIGURE	| ***agent***					
EVENT_LAYERS	| MANNER	| **walking_gait**				
	| PATH	| ROUTE	① INIT	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
			② INTER	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
			③ FIN	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
		| P_DIM	| DIR	| *vert* ∨ *hor* ∨ *lat*	
			| SHAPE	| *trace_shapes*	
			| VEL	| *measure_of_velocity*	
			| EXTENT	| *measure_of_extent*	
EVENT_PROPERTIES	| ASPECTUAL_CLASS		| *bounded* ∨ *unbounded* ∨ *underspec*			
			| PHASE_ARRAY	| Pα	| \walk ⊔ ①
				| Pμ	| walk ⊔ ②
				| Pω	| \walk ⊔ ③

The profile of the path-generating manner-of-motion verb *walk*

- three forms of profiling operations on frames effective in the semantics of motion verbs:
  - the pronounced de-selection of frame elements
  - the explicit selection of frame elements with primary focal prominence
  - the affirmation of secondary focus elements

Profiles for path-generating manner-of-motion verbs: graded secondary focus?

A highly specific gait – which means a high prominence of the manner attribute – may lead to a lower prominence of the element with secondary focal prominence, i.e. the PATH attribute.

- Verbs of basic locomotion such as *walk, run, swim, sail, bike, ride* accept measure phrases on paths like *two miles* without reservation.
- Verbs that express highly specific and often quite peculiar gaits like *limp, shuffle* and *trudge* do not go together too well with these phrases if there is no directional complement, at least when contrasted with the above mentioned basic locomotion verbs.
  - Directional complement explicitly accentuates the path.

(1) a. He walked / ran / rode two miles (through the wilderness).
b. ?He limped / shuffled / trudged two miles.
c. He limped / shuffled / trudged two miles through the wilderness.

(2) a. Er lief / rannte / ritt zwei Kilometer (durch die Wildnis).
b. ?Er hinkte / schwankte / schlurfte / stapfte / stolperte / tapste / torkelte / trottete / watschelte zwei Kilometer.
c. Er hinkte / schwankte / schlurfte / stapfte / stolperte / tapste / torkelte / trottete / watschelte zwei Kilometer durch die Wildnis.

- Subject to further research on weighted frame elements

Head-verb external specification of manner: infinite manner verbs

[Fr.] Il sortit de la maison en courant.

[Sp.] La botella entró a la cueva flotando.

[It.] La barca passò sotto il ponte galleggiando.

[Germ.] Er ging hinkend aus dem Haus.

[Engl.] He walked out of the house limping.

locomotion		
FIGURE	*agent* ∨ *theme*	PROPERTIES
		BEHAVIOUR

The basic structure of the FIGURE attribute

gehen					
FIGURE	AGENT	**BEHAVIOUR**	**MOM_SPEC**	④	**hinken_gait**
EVENT_LAYERS	MANNER	gehen_gait ⊔ ④			

The relevant frame extract for *hinkend gehen* 'go/walk limping'

- cf. non-manner-related concurrent activities:

  [Germ.] Er ging pfeifend aus dem Haus.

  [Engl.] He walked out of the house whistling.

gehen				
FIGURE	AGENT	**BEHAVIOUR**	**CONC_ACT**	**pfeifen**
EVENT_LAYERS	MANNER	gehen_gait		

The relevant frame extract for *pfeifend gehen* 'go/walk whistling'

Path plus infinite manner verbs in Romanic

sortir						
FIGURE	| AGENT	| **BEHAVIOUR**			| **MOM_SPEC**	| **④ courir_gait**
EVENT_LAYERS	| MANNER	| ④				
	| PATH	| ROUTE	| ① INIT	| L_REL	| in
					| GROUND	| house
				| ② INTER	| L_REL	| ~in
					| GROUND	| house
EVENT_PROPERTIES	| ASPECTUAL_CLASS		| *bounded*			
			| PHASE_ARRAY		| Pα	| ①
					| Pμ	| ②

The representation of French *sortir de la maison en courant* in the *locomotion* frame

descendre						
FIGURE	| AGENT	| **BEHAVIOUR**			| **MOM_SPEC**	| **④marcher_gait**
EVENT_LAYERS	| MANNER	| ④				
	| PATH	| ROUTE	| ① INIT	| L_REL	| \on
					| GROUND	| mountain_trail
				| ② INTER	| L_REL	| on
					| GROUND	| mountain_trail
				| ③ FIN	| L_REL	| \on
					| GROUND	| mountain_trail
		| P_DIM	| DIR		| *vert_down*	
EVENT_PROPERTIES	| ASPECTUAL_CLASS		| *underspec*			
			| PHASE_ARRAY		| Pα	| \descendre ⊔ ①
					| Pμ	| descendre ⊔ ②
					| *Pω*	| *\descendre ⊔ ③*

The representation of Fr. *descendre de la montagne en marchant* in the *locomotion* frame

Head-verb external specification of manner: VP-level manner adverbs and dependency constraints

- Dependency constraints serve to capture the impact of one frame attribute on a distinct but related frame attribute.
- The case of velocity adverbs *(walk quickly/slowly)*:

  a. DCquickly: FIGURE | AGENT | BEHAVIOUR | EXEC_MODE | ↑©1 quick →
  EVENT_LAYERS | PATH | P_DIM | VEL | ↓©1 high

  b. DCslowly: FIGURE | AGENT | BEHAVIOUR | EXEC_MODE | ↑©2 slow →
  EVENT_LAYERS | PATH | P_DIM | VEL | ↓©2 low

walk					
FIGURE	| AGENT	| **BEHAVIOUR**		| **EXEC_MODE**	| **↑©₁ quick**
EVENT_LAYERS	| PATH	| ROUTE	① INIT	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
			② INTER	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
			③ FIN	| L_REL	| *loc_rel*
				| GROUND	| *physical_object*
		| P_DIM	| VEL	| **↓©₁ high**	
EVENT_PROPERTIES	| ASPECTUAL_CLASS		*bounded* ∨ *unbounded* ∨ *underspec*		
		| PHASE_ARRAY	| Pα	| \walk ⊔ ①	
			| Pμ	| walk ⊔ ②	
			| Pω	| \walk ⊔ ③	

The representation of *walk quickly* in the *locomotion* frame

Head-verb external specification of manner: Depictive manner predicates

- Depictive predicates are treated as additional predications that pertain to the figure but are not immediately linked to the situation designated by the motion verb, as one cannot only walk, shuffle, amble or sneak away, but also read, cook, eat or play the piano in one's slippers or barefooted.

walk					
FIGURE	| AGENT	| **PROPERTIES**		| DRESS | FOOTWEAR | **slippers**	
EVENT_LAYERS	| **MANNER**	| **walking_gait**			
	| PATH	| ROUTE | ① INIT	| L_REL	| *loc_rel*	
			| GROUND	| *physical_object*	
		| ② INTER	| L_REL	| *loc_rel*	
			| GROUND	| *physical_object*	
		| ③ FIN	| L_REL	| *loc_rel*	
			| GROUND	| *physical_object*	
EVENT_PROPERTIES	| ASPECTUAL_CLASS	| *bounded* ∨ *unbounded* ∨ *underspec*			
		| PHASE_ARRAY	| Pα	| \walk ⊔ ①	
			| Pμ	| walk ⊔ ②	
			| Pω	| \walk ⊔ ③	

A (considerably simplified) representation of *walk in slippers* in the *locomotion* frame

Varieties of manner-of-motion: Force expressions

Geuder & Weisgerber (2008), Gamerschlag, Geuder & Petersen (2014)

- Verbs of vertical movement like *climb, klettern, steigen* (in its manner-of-motion reading) describe a manner of motion that specifies force configurations on a path.
- The force configuration for *climb*, *klettern, steigen* is the manner 'upward force exertion (against the ground)'
- This manner implies a direction ('upward'), which, however, applies only to the force exerted against a ground object, such as (the steps of) a ladder.
- The overall trajectory of the movement is independent of this force-related direction. Hence this manner of movement may occur on downward paths as well:
  - *to climb up/down a mountain*
  - *auf das Dach klettern – vom Dach klettern*
  - *in einen Schacht hinab/hinauf steigen*
  - *in ein Auto steigen*

Varieties of manner: force expression *in den Schacht steigen*

steigen_mm						
FIGURE	| AGENT | LEGS	| ⑤				
EVENT_LAYERS	| MANNER	| **FORCE**	**| AGONIST**	**|** ⑤		
			| ANTAGONIST	**|** ⑥		
			| EXERTION	**| DIR**	**|** *upwards*	
			| INTENSITY	**|** *medium_high*		
			| EFFECTUATES	**|** ⑧		
		| ⑧ **EXECUTION**		**| GAIT**	**|** *stepwise*	
	| PATH	| ROUTE	| ① INIT	| L_REL	| *loc_rel*	
				| GROUND	| *physical_object*	
			| ② INTER	| L_REL	| ~in	
				| GROUND	| ⑨ *funnel* | STEPS | ⑥	
					| OS | ORIENTATION ⑦	
			| ③ FIN	| L_REL	| in	
				| GROUND	| ⑨	
		| P_DIM	**| DIR**	**|** *vertical* ⊔ ⑦		
			| SHAPE	| *trace_shapes*		
			| VEL	| *measure_of_velocity*		
			| EXTENT	| *measure_of_extent*		
EVENT_PROPERTIES	| ASPECTUAL_CLASS		| *bounded*			
			| PHASE_ARRAY	| Pα	| \steigen ⊔ ①	
				| Pμ	| steigenn ⊔ ②	
				| Pω	| \steigen ⊔ ③	
	| ORIGO		| *entity*			
	| TENSE		| *past* ∨ *present* ∨ *future*			
	| ASPECT		| *perfective* ∨ *imperfective* ∨ *perfect* ∨ *prospective*			

Force expression *in einen Schacht steigen* 'climb into a funnel' in the *locomotion* frame

Outlook – what comes next?

- Varieties of manner
  - space-dominant (to *walk, run, limp*)
  - time-dominant (to *race, rush, dash; to amble, stroll*)
  - intentional (*to hasten, hurry*)
  - instrumental (*to ski, skate, row*)
  - force-exerting (*to climb up/down the hill, in den Schacht/auf die Leiter steigen*)
  - related to a medium (*to swim, flay, dive*)
- Division of labour in profiling: Serial Verb Constructions in Korean, Thai, ...
- Model psycholinguistic findings from HULC Lab experiments with Johannes Gerwien in FAMEu: manner types, weight assignments and weight propagation

Thank you!

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