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CZECH VERBS OF MOTION AND CUMULATIVITY

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ABSTRACT

This paper describes the semantics of Czech verbs of motion. It examines predictions of the event-based accounts of plurality in the verbal domain (Krifka 1992; Kratzer 2005; van Geenhoven 2004) and applies it to Czech data. It connects morphological processes with the cumulativity and generic operators in semantics.

KEYWORDS: verbs of motion; formal semantics; events; cumulativity; genericity.

1. Data and problem

Czech determinate/indeterminate verbs are usually verbs of motion. The most common pairs of determinate and indeterminate verbs in Czech are those listed in (1):

(1)	*Determinate*	*Indeterminate*	
	jít	chodit	‘go by foot’
	letět	létat	‘fly’
	nést	nosit	‘carry’
	vést	vodit	‘lead’
	vézt	vozit	‘transport’
	jet	jezdit	‘go by vehicle’
	valit	válet	‘roll’
	růst	rozrůstat se	‘grow’
	kvést	rozkvétat	‘bloom’

For Polish, Piñon (1997) points out similar verbs: *iść – chodzić*, *jechać – jeździć*, *biec – biegać*, *lecieć – latać*, etc. Determinate verbs bear a strong morphological resemblance to their indeterminate counterparts, but Czech doesn’t have a productive rule relating the members of the two groups. These pairs of verbs of motion form a closed class in

modern Czech. Although both a determinate verb and its indeterminate counterpart are usually classified as imperfective, determinate verbs behave according to some standard tests as perfective verbs and indeterminate verbs behave as imperfective verbs.[1] Determinate verbs cannot be used as complements of phrasal verbs; they need an object. In negative imperatives they must be replaced by their indeterminate counterparts (analogically to perfective verbs – if perfective verbs are negated and used in imperative, they usually change into the imperfective form):[2]

(2a) Petr bude *jít/*letět/*jet do Prahy.
'Petr will go^{Det}/fly^{Det}/drive^{Det} to Prague.'

(2b) Petr bude chodit/létat/jezdit do Prahy.
'Petr will go^{Indet}/fly^{ndet}/drive^{ndet} to Prague.'

(3a) Petr jde/letí/jede do Prahy.
'Petr is going^{Det}/flying^{Det}/driving^{Det} to Prague.'

(3b) *Petr jde/letí/jede.
'Petr is going^{Det}/flying^{Det}/driving^{Det}.'

(3c) Petr chodí/létá/jezdí.
'Petr is going^{Indet}/flying^{Indet}/driving^{Indet}.'

(4a) Leť tam!/*Neleť tam!/Nelétej tam!
'Fly^{Det} there!/(Don't fly^{Det} there!)/Don't fly^{Indet} there!

(4b) Jeď tam!/*Nejeď tam!/Nejezdi tam!
'Drive^{Det} there!/(Don't drive^{Det} there!)/Don't drive^{Indet} there!

But according to the other tests the determinate verbs behave as regular imperfectives: they can get a simple ongoing interpretation in the present tense; they can form present participles; and in discourse, they combine to form non-overlapping events in the narrative. The usual lore about determinate/indeterminate verbs (Kopečný 1962, among others) makes two important observations:

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[1] Perfective verbs cannot get a simple ongoing interpretation in the present tense; they cannot be used as the complements of phrasal verbs such as *begin/finish/continue*; they cannot form present participles; in discourse, they combine to form non-overlapping events in the narrative; they need an object; in negative imperatives they must be replaced by imperfectives.

[2] I will not translate examples in word-for-word fashion in this article because most of the verbs here have no precise counterpart in English. So I will translate only the meaning of the sentence, noting important morphological features.

(1) Indeterminate verbs are "iterative", whereas their determinate counterparts are "semelfactive". This holds only to some extent (as is usually claimed even in traditional grammars) because indeterminate verbs can be used to describe specific occurrences of a process, which is not possible for the regular iteratives:

(5a) Petr právě teď běhá do knihovny.
'Petr right now is running^{Indet} to the library.'

(5b) *Petr právě teď běhává do knihovny.
'Petr right now runs^{Iter} to the library.'

(2) Determinate verbs are unidirectional, and indeterminate verbs are multidirectional; they describe motion taking place in many directions. This is of course not true, because the direction is not strictly unidirectional for determinate verbs:

(6) Petr jel/běžel/letěl kolem jezera.
'Petr drove^{Det}/ran^{Det}/flew^{Det} around the lake.'

But there is a role for spatial direction to play: as Piñon (1997: 474) claims,

> [I]ndeterminate verbs are "multidirectional" in the sense that at least two parts of every motion process in their denotations differ in spatial direction [...] indeterminate verbs always denote "complex" processes [...] determinate verbs, in contrast, denote motion processes that are "simple" in the sense that they are single uninterrupted stretches of motion.

Every indeterminate verb can be morphologically amended with the *-ova-* suffix (by *-ova-* suffix I label every V*va-* variant of the suffix – I'm not trying to determine exact morphological changes of this suffix for every stem). The *-ova-* suffix is generally used for making secondary imperfectives from perfectives: *pode-psat*^{P} – *pode-pis-ova-t*^{I} 'subscribe'; or for making generic verbs: *psát*^{I} – *psá-va-t*^{I} 'write', *pro-hrá-va-t*^{I} – *pro-hrá-vá-va-t*^{I} 'gamble away'. In the last example (*pro-hrá-vá-va-t*), we see both usages of the *-ova-* suffix on the same verb: the first occurrence of the suffix makes the perfective verb (*pro-hrát*) imperfective, while the second suffix makes this imperfective verb obligatory generic. This is illustrated in the next sentence, which is ungrammatical with the time point adverbial but perfectly grammatical with any quantifier ranging over events:

(7) Petr prohrá-vá-va-l dům *včera v 8:00/každý den.
'Petr gambled away his house *yesterday at 8:00/every week.'

For determinate/indeterminate verbs there is a third verb for every one of them, produced by the *-ova-* suffix added to the indeterminate verb. Let us call this third type of verb a "generic motion verb" without committing to any serious theory of genericity so far.[3]

(8)	jít	chodit	chodívat	'go by foot'
	letět	létat	létávat	'fly'
	nést	nosit	nosívat	'carry'
	vést	vodit	vodívat	'lead'
	vézt	vozit	vozívat	'transport'
	jet	jezdit	jezdívat	'go by vehicle'
	valit	válet	válívat	'roll'
	růst	rozrůstat se	rozrůstávat se	'grow'
	kvést	rozkvétat	rozkvétávat	'bloom'

In this article I will first explain the semantics of these triplets, which will also be the key ingredient in the description of their syntactic distribution. Next I will deal with the cumulative interpretations of events and objects in sentences containing determinate/indeterminate verbs and singular/plural arguments of these verbs. And, as a by-product, I will look into the workings of generic and episodic sentences in Czech and also into the formal explanation of the intuitions about the meaning of determinate/indeterminate verbs.

2. Semantic background

This paper pursues some of the interpretative consequences of the interaction between determinate and indeterminate verbs and their arguments. In the literature (Beck and Sauerland 2000; Kratzer 2005; and older references cited in these articles) it is observed that sentences containing more than one plural determiner phrase (DP) often have inter-

[3] An anonymous *PSiCL* reviewer suggested that the process of generic verb of motion forming is a bit different in Polish because the class of generic verbs of motion in Polish seems to be limited to just one case: (*iść*, *chodzić*, *chadzać*). In other cases, generic forms require perfective affixation: (e.g. *lecieć*, *latać*, *oblatywać*). I assume that the "generic" prefixed verbs in Polish are not real generic verbs at all. At least in Czech prefixed generic verbs (as in (i)) allow for the episodic interpretation which is unavailable for the true generic verb (as in (ii)). So I assume that the Polish verbs of the *oblatywać* type are secondary imperfectives but not true generics. Of course further serious work should be made on this topic and I postpone this for another article.

(i) Petr ob-létával město hodinu.
'Peter PREF-flied around the city for an hour.'

(ii) *Petr létával město hodinu.
'Peter flied around the city for an hour.'

estingly weak truth conditions; e.g., (9) can be true if student 1 drank two beers and student 2 drank one beer, or in the situation where student 1 drank one beer and student 2 drank two beers, or in a situation where each student drank one beer and they together drank a third beer. Example (9) is true as long as three beers were consumed and two students did the drinking. Let us call this meaning of (9) cumulative. The cumulative meaning doesn't follow from the existence of two distributive interpretations. Firstly, distributive interpretation retaining the linear scope would mean that six beers were consumed – three by each student. Secondly, distributive interpretation – with inverse scope of quantifiers – would mean that three beers were consumed by two students but it disallows the reading where one beer is split between two students. The third and crucial point: neither of the distributive interpretations can relax the strict correspondence between beers and students, but this strict correspondence isn't part of the cumulative meaning of (9), which is true in any of the described situations.[4]

(9) Two students drank three beers.

I will use the event semantics machinery in the spirit of Kratzer (2001, 2005) where each verb denotes links between individuals and events. The domain of entities D_e should contain both singular and plural individuals (plural individuals are constructed as sums: D_e is closed under sum formation). If two individual *x* and *y* are in D_e, also their sum $x+y$ is in D_e. In addition to D_e we also need a domain for events D_s which is also cumulative and closed under sum operation. The sum operation also applies to ordered tuples built from both domains, so the sum of the pair <John, $snore_1$> and <Mary, $snore_2$> is <John+Mary, $snore_1$+$snore_2$>. The pluralization operation can be defined so that it maps sets that come with a sum operation to their smallest cumulative superset. Imagine that there are just two individuals – John and Mary, and two events – $snore_1$ and $snore_2$. Then the pluralization operator * generating cumulative verb meaning can be illustrated as in (10b):

(10a) [[snore]] = {<John, $snore_1$>, <Mary, $snore_2$>}
(10b) [[*snore]] = {<John, $snore_1$>, <Mary, $snore_2$>, <John+Mary, $snore_1$+$snore_2$>}

This *-operator is a pluralization operator and represents a theoretical tool for the description of plural verbs (sometimes called pluractionalized verbs). Let us assume with Kratzer (2005) that there are two sources of this operator: one source is lexical pluralization – all simple predicative stems are born as plurals;[5] the other source of pluraliza-

[4] Kratzer (2005) even claims that distributive interpretations can be subsumed under the cumulative interpretations. I will not examine this assumption in detail but I will accept it as a silent premise for the rest of the article.

[5] In Kratzer (2001: chapter 4) it is stated even more boldly: "Cumulative Universal: The denotations of simple predicates in natural languages are cumulative."

tion is provided by plural DPs or by some other operators in derivational morphology – this point will be very important for the description of Czech verbal affixation in the next section.

The logical form of sentence (9) repeated as (11a) in the event semantics framework amended with *-operator is (11b). Some assumptions behind this formalization are as follows: *-operators attached to the arguments of verbs are cumulative because their DPs have a [plural] feature which makes them, and in some situations also their sister node, pluralized. A *-operator on the verb comes as a lexical semantic reflex of the inherent plurality of all predicates (in this sense verbs are distinguished from nouns); verb roots are inherently plural as suggested by Krifka (1992) and Kratzer (2005) while nouns are not (at least when some overt or nonovert morphology is added to the bare root):

(11a) Two students drank three beers.
(11b) $\exists e \exists x \exists y$ [*student(x) $\wedge$ /x/ = 2 $\wedge$ *agent (x)(e) $\wedge$ *beer(y) $\wedge$ /y/ =3 $\wedge$ *drink(y)(e)]

Logical form in (11b) predicts that the sentence (11a) would be true in any situation where a group of students with the cardinality two is in some way drink-mapping to the group of beers with the cardinality three. This describes exactly the cumulative reading associated with the sentence (11a).

3. Analysis

3.1. Two sources of *-operator

First let us begin with sentences containing one plural DP, one singular DP, and all three types of determinate/indeterminate/generic verbs – see examples (12–14). The intuitive reading of sentence (12) is that there were five separate events of flying, one each for every professor; which also means that the congresses can be different for each of them. Of course (12) can also be true in a situation where all professors flew to the same congress: a hallmark of the cumulative operator which can spread the events and objects in the right way. On the other hand, the intuitive reading of (13) is the reading where five different professors flew in separate events to the same congress. There is no reading where there are different congresses for each of them but then (13) also means that for every professor there were at least two journeys to the congress (or one journey there and one journey back at least). The reading of (14) adds to the meaning of (13) a generic component: the most natural reading of (14) is that habitually/generally for each of the five professors there were at least two events of flying to a congress. One last important remark: in each of the sentences is the verb in singular (a well-known fact about Slavic quantifiers: if you use a cardinality quantifier > 4, the agreement on the verb is singular; if you use a cardinality below 5 and >1, the agreement on the verb is plural).

(12) Pět profesorů let-ě-lo na kongres.
'Five professors flew-DET-SG to a congress.'

(13) Pět profesorů lét-a-lo na kongres.
'Five professors flew-INDET-SG to a congress.'

(14) Pět profesorů lét-áva-lo na kongres.
'Five professors flew-INDET-GEN-SG to a congress.'

How can we account for the data in a theory? Van Geenhoven (2004) discusses pluractionality operators in English and West Greenlandic. Let us repeat her example (78) here as example (15). Van Geenhoven claims that the *for a long time* quantifier forces the pluractionalized interpretation on the achievement verb *explode* – she uses non-event semantics but her observation can be translated to the framework used here as (16). What is important is that she claims that verb meaning can be pluralized by external sources: either quantifiers over events or some visible morphological operator (there are many of them in West Greenlandic); the second option will be important for the description of Czech facts.

(15) ??/? The bomb exploded for a long time.
(i) # 'The explosion of the bomb was going on for a long time (slow-motion explosion).'
(ii) 'The bomb exploded again and again for a long time (magic bomb).'[6]

(16) exploded for a long time → λeλx (*-exploded(x) ∧ patient(x,e) ∧ long_time(e))

And for the unusual wide scope reading of singular objects in contrast to the narrow scope of bare plurals (famous from the work of Krifka and Verkuyl) as exemplified in van Geenhoven examples (99) and (101) – repeated here as (17) and (18) – she claims that both readings are pluractionalized by the *for an hour* quantifier, but only (18) has the appropriate internal argument of *eat* (the bare plural), which can be distributed over the subevents of eating denoted by the verb. Because singular is non-distributable then (17) sounds odd because it suggests an event where Mary ate the same sandwich again and again which is in contradiction with the properties of our world – but we can imagine a magical world where this sandwich, after being eaten, emerges again; and in this type of world (17) would be an admissible sentence. The trigger of the pluractionalized aspect is, for van Geenhoven, the time adverbial *for an hour*. This is of course quite a

[6] An anonymous reviewer suggested that there is a genuine type of bomb known as a cluster bomb that consists of one main charge in a container, which, upon impact, releases a large number of smaller anti-personnel bombs that explode individually. Such a (cluster) bomb could (plausibly) explode for a long time and would be alas (for our world) a better example than the magic bomb.

different explanation of the famous facts surrounding the telicity debate (see Krifka 1989, 1992, 1998), where usually the frequentative aspect is sidetracked and neglected. But van Geenhoven claims that the frequentative aspect is the crucial building block of the aspectual system of natural language.[7] The technical solution which Geenhoven offers for the data appears in the form of two frequentative operators: FREQP and FREQ; the former modifying verbs with the distributable internal argument, the latter connecting to verbs with non-distributable internal argument. Van Geenhoven's formalization of frequentized verb *eat* is repeated here as (19) for the distributive frequentative operator and as (20) for the non-distributive frequentative operator. As can be seen from (19) and (20), the most important distinction is between the bound/free variable status of the variable *y* – in (19) the variable *y* is bound by the *-operator, so we have the narrow scope reading of the object in (18) which means that the denotation of the object DP can vary for each event. On the other hand, in (20) we see that the variable *y* is bound only by the existential quantifier and the *-operator binds only the time variable *t*, so the denotation of the object is fixed for all subevents denoted by the pluralized predicate which is of course the right meaning for (17) and which, with the properties of our actual world, predicts its oddity.

(17) ?Mary ate a sandwich for an hour.
'Mary ate a sandwich and she ate it again and again for an hour.'

(18) Mary ate sandwiches for an hour.
'Mary ate a sandwich and she ate another sandwich and ... for an hour.'

(19) eat-FREQP → $\lambda P\ \lambda t\ \lambda x \exists y(*^{t,y}$ **eat**(x,y) at $t \wedge P(y))$ / y is distributable

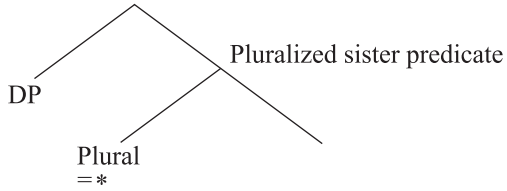
(20) eat-FREQ → $\lambda P\ \lambda t\ \lambda x \exists y(*^{t}$ **eat**(x,y) at $t \wedge P(y))$

I agree with van Geenhoven that the frequentative aspect is one of the keys to the aspect puzzles in natural language. Let us assume the event-based semantics introduced earlier and let us accept the insights of van Geenhoven. What can we say about the sentences (12–14) armed with this machinery? Let us assume with Kratzer (2005) that there are basically two sources of cumulativity: lexical cumulativity and syntactic cumulativity. The lexical cumulativity is, according to Kratzer, present on every predicative stem. The syntactic cumulativity comes, for Kratzer, from the [plural] number feature located on DP. In opposition to the [plural] number feature located on NP where the number feature is interpretable, the plural DP feature is uninterpretable on DP so it can pluralize its sister node; see (21), Kratzer's Figure 4. An immediate prediction of this proposal is that pluralization of phrasal verbal projections should require the presence of DPs with [plural] agreement features. This prediction works in most cases but there are some ex-

[7] I see this article on Czech data as more grist for the mill of van Geenhoven's arguments.

ceptions, as we have seen earlier in examples (12–14) where verb agreement was singular. It is evident that proper connection between morphological agreement and semantic pluralization should be done but it would be beyond the scope of this article.

(21)



Indeed Kratzer's hypothesis predicts the interpretive differences between (17) and (18) very nicely: the internal argument in (17) is in singular, so it cannot pluralize its sister node (in the vP layer where it moves because of case); the only *-operator then is on the V node stemming from the lexical cumulativity. Let us suppose the denotation of durational adverbials like *for an hour* as in (22) where the σ-operator maps the subevents e′ of the event e to their supremum – all subevents e′ are proper parts of e and have also the property P as e. The sum of the subevents lasts one hour and all subevents are cumulative, which follows from the P-property attributed to the whole event e and also to all of its subevents e′. If we substitute for the variable P the logical representation of the VP (let us take the (17) first and assume that VP meaning is coded as in (23)), we will obtain the logical form in (24):

(22) $\lambda P_{<st>}\, \lambda e\, [P(e) \wedge e = \sigma e'\, [P(e') \wedge e' < e\,] \wedge f_{hour}(e) = 1]$

(23) $\lambda e \exists x\, [sandwich(x) \wedge *eat(x)(e)]$

(24) $\lambda e\, \exists x\, [sandwich(x) \wedge *eat(x)(e) \wedge e = \sigma e'\, \exists x\, [sandwich(x) \wedge *eat(x)(e') \wedge e' < e\,] \wedge f_{hour}(e) = 1]$

(24) says that there was an event of eating some sandwich that was composed of proper subevents of eating a sandwich and lasted one hour. Because the **sandwich** predicate is not pluralized, it is the same sandwich in all subevents e′ – this follows from the semantics for the *for an hour* adverbial: if a sum of events involves just one sandwich then none of its subevents can involve more than one sandwich. This eating event is pluralized so there were at least two subevents of eating the same sandwich. This leads to the pragmatical oddity of (17).

If we look again at the five professors example, repeated with all three verb types below as (25), and we apply the event semantics device to it, we would have the following three interpretations for the three verb forms:

(25a) Pět profesorů let-ě-lo^{Det}/lét-a-lo^{Indet}/lét-áva-lo$^{Indet+Gen}$ na kongres.
(25b) [[let-ě-lo^{Det} na kongres]] → λe∃x [congress(x) ∧ fly_to(x)(e)]
(25c) [[lét-a-lo^{Indet} na kongres]] → λe∃x [congress(x) ∧ ∗fly_to(x)(e)]
(25d) [[Pět profesorů lét-á-va-lo$^{Indet+Gen}$ na kongres]] →
GEN [x,e] ∃y[*professor(x) ∧ /professor/=5 ∧ agent(x);
[congress(y) ∧ ∗fly_to(y)(e)]]

Example (25a) says that there was an event of flying to some congress. When we add an agent (done in syntax by the appropriate functional projection) to the event, we get the meaning (26). It says that there was an event with the pluralized agent (professors) and the number of professors were five and there were two pluralized predicates (**congress** and **fly_to**) – their plurality is the outcome of the sister node of pluralized DP pluralization; because the external argument is plural, its sister is syntactically pluralized – this is indicated by the *-operator before the inner square brackets. So the reading is what we expected: there is a plurality of professors and a plurality of congresses, and these two pluralities are connected by the **fly_to** relation. The only departure from Kratzer's system is the relaxation of the Cumulative universal (see footnote 4 here) – I believe that, at least in Czech, there are verb stems which are obligatorily interpreted as denoting singular events, not pluralities. The determinate verbs are one example, semelfactives would be another. So as can be seen in (25a) and (26), I do not pluralize the predicate **fly_to,** which is a logical translation of the Czech verb *let-ě-t^{Det}*. Of course sentences with the singular event verbs can be pluralized in syntax, as can be seen in the examples under scrutiny, but I don't assume that they are lexically pluractionalized verbs.

(26) letět^{Det}: ∃e∃x∃y [*professor(x) ∧ /x/=5 ∧ agent (x)(e) ∧
*[congress(y) ∧ fly_to(y)(e)]]

As for the indeterminate verb *létat*, when we add the agent to (25b), we end with the representation (27) and we immediately see a problem: according to (27i) there should be a reading where the congresses vary with the professors, or at least where there is not one fixed congress for every professor. But this reading is unattested for the Czech sentence (13). Here we can combine the insights of Kratzer and van Geenhoven together: van Geenhoven claims that there are two pluractional operators FREQP and FREQ (see (19) and (20)), and they are used according to the distributivity of the internal argument. If I am right, then in the case of determinate verbs there is no FREQ/FREQP operator provided by the verb – there is only the *-operator which is supplied by the [plural] DP feature. On the other hand, in the example (25b) there is a *-operator on the verb and it is either FREQ or FREQP, depending on the internal argument. In example (25b) the internal argument is singular, so the FREQ *-operator must be used. We can express this in the appropriate logical representation in (27ii). There is a questionable moment in my argumentation – if the predicate **congress** is not pluralized by the verbal *-operator, then why it is not pluralized by the [plural] number feature as in (26)? I think the best

way to solve this problem is to claim that it is in the scope of the verb *-operator; and even if it is not bound by the *-operator, it is bound by the existential quantifier which is part of its meaning (see (20)) and this existential quantifier roofs it from binding by any other higher quantifier.

(27) létat^{Indet}:

(i) ∃e∃x∃y [*professor(x) ∧ /x/ = 5 ∧ agent (x)(e) ∧ *
[congress(y) ∧ *fly_to(y)(e)]]

(ii) ∃e∃x∃y [*professor(x) ∧ /x/ = 5 ∧ agent (x)(e) ∧
[congress(y) ∧ *fly_to(y)(e)]]

For the last verb form from the triplet – the *lét-á-va-t* form – I assume the semantic representation in (25c), repeated below as (28) which says that for all relevant events containing five professors these professors flew to some congress. So the meaning of the verb is built on the meaning of (27ii) plus the generic operator – see Carlson and Pelletier (1995) for the exact semantics of GEN operator – which is in Czech overtly signalized by the morpheme *-ova-*. I will deal with some issues of genericity in the next section.

(28) [[Pět profesorů lét-á-va-lo na kongres]] →
GEN [x,e] ∃y[*professor(x) ∧ /professor/=5 ∧ agent(x);
[congress(y) ∧ ∗fly_to(y)(e)]]

If my argumentation is right then we should observe the same phenomena – wide scoping of the object with the singular event verbs and narrow scoping of the object with the pluralized verbs – even outside the verbs of motion. And indeed this is the case, as we see in (29) and (30); the single event verb *nést* forces the cumulative reading on the internal argument, while the pluralized verb *nosit* forces the noncumulative reading of its internal argument:

(29) Dva lidi v davu nesli kocoura.
'Two people in a crowd carried^{Single} a tomcat.'
∃e∃x∃y [*people_in_crowd(x) ∧ /x/ = 2
∧ *agent (x)(e) ∧ *tomcat(y) ∧ *carry(y)(e)]

(30) Dva lidi v davu nosili kocoura.
'Two people in a crowd carried^{Plural} a tomcat.'
∃e∃x∃y [*people_in_crowd(x) ∧ /x/ = 2
∧ *agent (x)(e) ∧ tomcat(y) ∧ *carry(y)(e)]

I believe that the empirical evidence from Czech points to some generalization: if the language has an overt morphological marker for pluralization of verbs, then its absence on the particular verb is interpreted as the signal of the singularity of the event denoted by the verb. This can be seen as an extension, or slight correction, of Kratzer's hypothesis which was formulated for Germanic languages.

3.2. Genericity and Episodicity

In this section I aim to support my claim that the distinction between determinate and indeterminate verbs is the singularity/plurality distinction, while the distinction between generic motion verbs and indeterminate verbs is the genericity operator which is morphologically and semantically present on the generic motion verbs but missing on the indeterminate verbs.

As is well known, free choice items (FCIs; the most famous example the English *any*) are incompatible with episodic sentences. Let us assume Carlson's conception of generic/episodic distinction:

> Notionally, a generic sentence is one expressing a regularity, as opposed to an instance from which one infers a regularity. For example, the generalization The sun rises in the east expresses a regularity, while The sun rose this morning in the east expresses an instance from which, along with other such instances, one infers a regularity.
>
> (Carlson 1989:167)

Further, "[g]eneric sentences [...] are (i) stative sentences (ii) based on lexically non-stative predicates and (iii) they are intensional and (by all appearances) non-monotonic" (Carlson 1989: 168). In the present day the most successful theories of FCIs' licensing build upon the insight that there is a modal meaning component in the semantic fabric of FCI and this dictates their distribution: they must be in a scope of intensional/non-veridical operator. Let us assume that Giannakidou (2001) is right in stating the distribution of FCIs as in (31). This correctly predicts the ungrammaticality of (32a) and (32b) where the FCI *any* is not in a scope of nonveridical operator; and besides, both sentences are episodic. (33a) and (33b), on the other hand, are grammatical because in (33a) the FCI is in the scope of intensional modal operator and in (33b) it is in the scope of nonveridical operator (negation). Both sentences (33a) and (33b) are nonepisodic also.

(31) Licensing condition on FCIs A FCI α is grammatical in a sentence S if:
(i) α is in the scope of a nonveridical operator β; and
(ii) S is not episodic.

(32a) *Peter talked to any woman.
(32b) *Any student didn't arrive.

(33a) This student can solve any problem.
(33b) Petr didn't read any book from Nabokov.

If we look at the distribution of FCIs (Czech has a full paradigm of FCIs – pronouns ending with the *-koli(v)* suffix) in the three types of discussed verbs, we see immediately that with the single event motion verbs, FCIs are ungrammatical; with the indeterminate verbs, the result is slightly better; and with the generic verb the outcome is fully grammatical.

(34a) *Petr běžel jakýkoliv závod.
'Petr ran^{Det} any race.'

(34b) ??Petr běhal jakýkoliv závod.
('Petr ran^{Indet} any race.')

(34c) Petr běhával jakýkoliv závod.
'Petr ran^{Gen} any race.'

The question is why we see slight grammatical improvement in (34b). I suppose it is because indeterminate verbs are pluralized, which means that they denote plurality of events and plurality of events is the necessary condition for genericity. But indeterminate verbs can describe episodic events, and in that case they are inappropriate licensors for FCIs. But generic verbs of motion are necessarily generic and disallow any time point adverbial – so they are a natural environment for the FCIs:

(35a) *Petr běhal běhal včera v 8:00 kolem kostela *jakýkoliv závod.
'Petr ran^{Indet} yesterday at 8:00 around the church *any race.'

(35b) Petr běhával jakýkoliv závod *včera v 8:00.
'Petr ran^{Gen} any race *yesterday at 8:00.'

The outcome of this section is that generic motion verbs are necessarily generic, while indeterminate can be used to describe pluralities of events but they are not necessary generic.

4. Spatial directions

I will now explain how we can connect the spatial directionality of motion verbs with their plurality/singularity status. As is well known, there is event-path homomorphic

unity for the motion verbs (see Piñon 1993; Ramchand 2007). This homomorphism is achieved by two mappings (see Piñon 1993):

(36) (events to paths)
$\forall e \forall e' \forall p[\text{Loc}_P(e, \tau(e)) = p \wedge e' \leq e \rightarrow \exists p'[p' \leq p \wedge \text{Loc}_p(e', \tau(e') = p']]$

(37) (initial path to event)
$\forall p \forall p' \forall e[\text{Loc}_p(e, \tau(e)) = p \wedge p' << p \rightarrow \exists e'[e' \leq e \wedge \text{Loc}_p(e', \tau(e') = p']]$

$\tau(e)$ is the temporal trace of event e (see Krifka 1989) and Loc_p is a mapping from motion events and their temporal traces into paths. The first mapping means that every subevent of an event 'running to the woods' corresponds to a partial path of the path traversed to the woods. The second mapping states that every initial path of the path traversed to the wood corresponds to a subevent of running.

The PP *do lesa* 'to the woods' refers to an indefinite path (one of the vectors which leads into the place 'the woods'), so the path variable should be existentially bound:

(38) $[[\text{do lesa}]] = \lambda Q \lambda e \exists p[Q(e) \wedge \text{to-the-woods}'(p)]$

So we can say that by the pluralization of the verb we pluralize events in the denotation of the verb, and because there is the event-path homomorphism, there is also a pluralization of paths belonging to the events. From this point of view then, determinate and indeterminate motion verbs are just special examples of the pluractionality: determinate verbs are singular and because they are mapped to paths, also their Loc_p is singular; indeterminate verbs are pluralities and thus their Loc_p are plural which leads to the famous distinction between one path interpretation of determinate verbs and multiple path interpretation for the indeterminate verbs.

It is interesting that sometimes the *-operator can have scope over the phrase 'in an hour'. In (39), the 'in two hours' phrase measures the span between first and second subevent, which means going to the library (first subevent) and back (second subevent). On the other hand, the phrase 'for an hour' has scope over the *-operator and measures the whole event, as can be seen in (40). (40) means that the whole event of at least two subevents (running to the library and back) lasted two hours.

(39) Petr běhal do knihovny za dvě hodiny
'Petr ran to the library in two hours.'

(40) Petr běhal do knihovny dvě hodiny.
'Petr ran to the library for two hours.'

5. Summary

This article was dedicated to the formal semantic description of the motion verbs in Czech. I have shown that the distinctions of determinate, indeterminate, and generic verbs of motion can be described by the tools of event semantics. This (aside from the formal precision) gives us some insights into the inner working of the Czech aspectual system. The main conclusions are as follows: (1) The meaning of the determinate verbs are singular events connected to arguments of the verbs. (2) The meanings of indeterminate verbs containing a pluractional operator are signalized by the stem vowel change (*-a-/-i-/-e-* stem) which manufactures cumulative event interpretation. (3) The meaning of the generic motion verbs is based on the indeterminate verbs, and furthermore contains a generic operator morphologically signalized by the suffix *-ova-*. (4) The multidirectionality of the indeterminate verbs follows from their plurality combined with the path-event homomorphism.

There are two theoretical outcomes: the hypothesis which claims that if a language has an overt morphological marker for pluralization of verbs, then the absence of this marker on the particular verb is interpreted as the signal of the singularity of the event denoted by the verb;[8] also, another argument for the necessity of the description of the aspectual system of human language from the perspective of frequentative interpretation.

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[8] This hypothesis holds in its present form only for verbs of motion, as an anonymous *PSiCL* reviewer suggested correctly. Genericity blurs the picture that is to say. E.g. a sentence *Petr stavěl domy celý život* 'Peter built houses for his whole life' means generic repeating of the process of house building even if there is a distinct form *stavíval* which is the explicit frequentative form and the verb *stavěl* is simple imperfective. The hypothesis probably holds only if the described event is dynamical because as is well known the generic sentences are static. I leave this for future research.

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