

## Achievements and paths: Degree achievements from the Slavic perspective

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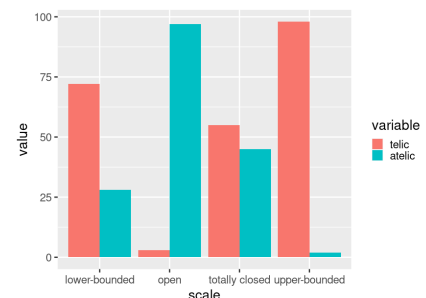
**Background.** Degree achievements (DAs) are especially challenging both for the compositional approaches to aspect in natural languages and to degree semantics of scalar expressions. While it is widely acknowledged (at least since Dowty 1979) that DAs like *dry* can have either “positive” ( $\approx$  telic) or “comparative” ( $\approx$  atelic) interpretation (independently of the cumulative/divisive nature of their arguments), this seems to be the case only for DAs derived from adjectives with at least partially closed scale, while it was observed that open-scale adjectives give raise to DAs with only “comparative” interpretation (e.g., *widen*, *deepen*). The most successful current approach to DAs (Kennedy and Levin 2008, KL) derives these basic facts via *Interpretive Economy* principle (IE): the degree semantic computation takes into account the lexical meaning of the source adjectives and KL operationalize IE via **pos** null degree morpheme KL’s approach gets the majority of English data right, nevertheless it does not scale up correctly to cross-linguistically broader data: by way of example, Japanese open-scale DAs seem to be interpreted only as “positive” (Kawahara 2017). Slavic languages add another twist: DAs with at least partially closed scale are not ambiguous, but their “positive/comparative” interpretation depends compositionally on the semantic properties of their prefix (or bare stem), moreover: lower-bounded Slavic DAs seem to be challenging KL’s theory which predicts them to be only “comparative”, contrary to the observed facts discussed below (empiry: Czech/Slovak corpus and native speaker judgments). Serious problems arise also for totally closed scales and open scales. In this paper, we will first present the challenging data patterns and then offer a partial extension of KL’s approach, which can deal with this kind of data.

**Data.** We worked mostly with Czech national corpus (CNC, Křen et al. 2015) from which we extracted (CQL/regular expression queries) the prototypical ways of prefixation and behaviour of four classes of Czech DAs. We focused on prefixed (perfective) DAs as they represent majority of Czech DAs (perfective RE .+*rovnat* ‘straighten’ yields 13946 CNC hits but the imperfective *rovnat* ‘straighten’ only 1469). We classified the “positive”/“comparative” interpretation of DAs based on the usual tests: a) contradiction test: “positive” interpretation of DAs leads to a contradiction in a schematic sentence *x DA, but it is not A-DA* (A-DA = source adjective); “comparative” interpretation does not (*The rod was widened/straightened but it wasn’t wide/#straight*); b) progressive  $\rightarrow$  perfect test: “comparative” reading allows (non-deductive) entailment from progressive to perfect, “positive” does not (English: *x is cooling*  $\rightarrow$  *x has cooled* under “comparative reading”; for Czech data we used imperfective  $\rightarrow$  perfective test with an equivalent entailment pattern); c) differential phrase compatibility: only “comparatively” interpreted DAs allow modification by differentials (*x widened/#straightened 2 meters*). Based on the combination of the three tests, we discovered that (see also graph): 1) **open-scale DAs** occur mostly with atelic (or ambiguous: route) prefixes with usually locative/down algebraic denotation (Zwarts, 2005): *pro-dloužit* ‘through-lengthen’, *u-krátit* ‘at-shorten’, *z-výšit* ‘down-heighten’; but there were telic (which in accordance with Zwarts (2005) are in the majority of cases based on the source and target algebraic denotation) prefixed DAs leading to “positive interpretation”: verbs *vy-hloubit* ‘from-deepen’, *do-hloubit* ‘to-deepen’; 2) **upper-bounded DAs** were mostly modified with prefixes with telic source/goal or ambiguous (route) semantics: *vy-rovnat* ‘from-straighten’, *do-schnout* ‘to-dry’; the only “comparatively” prefixed DAs were rare atelic (in pluralized algebraic meaning: Zwarts 2005) *o-schnout* ‘around-dry’ and *o-zdravit* ‘around-heal’; 3) **lower-bounded DAs** are mostly telic, contrary to KL’s predictions: telic *past* and ambiguous route semantics lead to “positive” interpretation: *za-špinit* ‘past-dirty’, *pro-vlhnout* ‘through-wet’; “comparative” DAs are formed with locative or ambiguous *down* prefixation: *na-vlhnout* ‘on-wet’, *z-kalit* ‘down-muddy’; 4) **totally closed DAs** behave differently from upper-bounded ones (again, contrary to KL): half of them are “posi-

tive” with telic source or ambiguous prefixes: *vy-prázdnit* ‘from-empty’, *pře-plnit* ‘over-fill’; half “comparative” with atelic *toward* prefixation: *při-plnit* ‘toward-fill’.

**Results & discussion.** Following KL we analyze the core meaning of DAs as a difference function ( $m_{\Delta}$ ) which measures (on an appropriate scale) how much an object changes as a result of an event. The difference measure function yields a lower-bounded scale which is type-shifted into the type of events. KL claim that there are two such type-shifters: i) the verbal positive form  $\mathbf{pos}_v$  ( $\llbracket pos_v \rrbracket = \lambda g \in D_{m_{\Delta}} \lambda x \lambda e. g(x)(e) \geq \mathit{std}(g)$ ) which via IE produces “comparative” reading for open scales and “positive” reading for at least partially closed scales; ii) verbal degree morpheme  $\mu_v$  which combines with differentials. Based on the data discussed above we claim that even if in languages like English the pragmatic/contextual information is the main factor in the interpretation of DAs (as reflected via  $\mathit{std}(g)$  in  $\mathbf{pos}_v$ ), at least for Slavic languages we have to add semantically much loaded type-shifters which are morphosyntactically realized as prefixes. Based on the DA pattern and the independent algebraic properties of prefixes/prepositions (following Matushansky 2002 a.o. we believe in the syntactic and semantic identity of prefixes and prepositions) – see Zwarts (2005) – we claim that there are (at least) two additional difference-function type-shifters. First, for telic prefixes we propose the type-shifting “positive” semantics:  $\llbracket \mathit{pref}_{tel} \rrbracket = \lambda g \in D_{m_{\Delta}} \lambda d \lambda x \lambda e. g(x)(e) = \mathit{max}(g)$  (following KL’s approach to telic modifiers); second, atelic prefixes for which we propose the “comparative” semantics:  $\llbracket \mathit{pref}_{atelic} \rrbracket = \lambda g \in D_{m_{\Delta}} \lambda d \lambda x \lambda e. g(x)(e) \geq \mathit{min}(g)$  (ambiguous prefixes can pick up telic/atelic reading depending on their atomic/pluralized algebraic denotation). **I) Open-scale:** KL predict only “comparative” reading (with the only exception: ‘conventionalized’ *cool*). Both the prediction and the exception are wrong: Czech open-scale DAs can be telic (not only in the case of *cool*), example with the application of  $\llbracket \mathit{pref}_{atelic} \rrbracket / \llbracket \mathit{pref}_{tel} \rrbracket$  in (1a/b).

- (1) a. Petr *vy-/do-hloubil* jámu.  
 Petr from-/to-deepened pit  
 $\lambda e. \mathit{deep}_{\Delta}(\text{the pit})(e) = \mathit{max}(\mathit{deep}_{\Delta})$   
 b. Petr *pro-hloubil* jámu.  
 Petr through-deepened pit  
 $\lambda e. \mathit{deep}_{\Delta}(\text{the pit})(e) \geq \mathit{min}(\mathit{deep}_{\Delta})$



**II) Upper-bounded:** this kind of DAs is where KL do get even the Czech data mostly right – upper-bounded Czech DAs are mostly prefixed with telic prefixes and only sporadically we found atelic prefixation which leads to “comparative” reading; we believe that the prefixation here mostly respects the lexical semantics of the source adjectives. **III) Lower-bounded:** KL predict only “comparative” reading, which is exactly the opposite of the distribution we observed (“positively” interpreted DAs like *pro-vlhnout* outnumber the “comparatively” interpreted DAs like *z-vlhnout*). Here again, the more ‘constructivist’ behavior of Czech (compared to English DAs) is easily explainable by the above introduced two types of telicizing/atelicizing type shifters. We hypothesize that the max interpretation is not computed from the lexical semantics of the source adjective but comes from the mapping of the completely affected object → max degree. **IV) Totally closed:** KL claim that these should behave identically to upper-bounded DAs. That clearly cannot be true for Slavic data and our enriched inventory of type-shifters should predict exactly the equilibrium of “comparative”/“positive” reading reported above: if the lexical scale supplies both min and max, they can be easily used by atelic/telic prefixes in the same proportion.

**Refs:** Dowty, D. (1979). *Word Meaning and Montague Grammar*. \* Kawahara, K. (2017). Non-neutrality and setting of standards in degree of change and motion events. *Linguistica Brunensia*, 65:2. \* Kennedy, Ch. & Levin, B. (2008). Measure of change. In *Adjectives and adverbs*. \* Křen, M. et al. (2015). *SYN2015: Reprezentativní korpus psané češtiny*. \* Matushansky, O. (2002). On formal identity of Russian prefixes and prepositions. *Phonological Answers*. MITWPL 42. \* Zwarts, J. (2005). Prepositional aspect and the algebra of paths. *L&P*, 28:6.