

## Scalar Complexity and the Structure of Events

The aspectual structure of change-of-state events often appears to correlate to privileged event participants, e.g. incremental themes (Krifka, 1989) or paths of motion (Talmy, 2000). In this paper I generalize these correlations considerably and argue that the relevant factor for understanding aspectual complexity (primarily durativity) is the complexity of the scale of change, as in (1).

- (1) The aspectual complexity of a change-of-state event is directly correlated with the complexity of the scale of change of the event.

Intuitively, (1) characterizes the differences between achievements (*John noticed the painting*) which are both punctual and involve non-gradable transitions (e.g. from not noticed to noticed, with no middle ground) and accomplishments (*John built a house*) which are both durative and encode gradable changes (e.g. from non-existent to built, understood as a gradual). The crucial distinctions are between punctual vs. durative events and simplex vs. complex scales denoting culmination. I argue that (1) explains these punctual/simplex and durative/complex correlations, as well as additional distributional correlations between different classes of overt result XPs and different aspectual classes of verbs in resultative and motion constructions. I formalize these claims in the mereological approach of Krifka (1998), which offers an intuitive understanding of the relevant notions of complexity.

The independent linguistic relevance of complexity (in its informal sense) is seen in the lexical encoding of aspectual/scalar information. Event complexities underlie many verbal aspectual classes. For example, traditional activities (*run, walk*) and semelfactives (*tap (once), snap (a finger)*) can be understood as differing only in durativity (cf. Engelberg (2000) for definitions explicitly employing this distinction). On the other hand, scalar complexity is relevant for classifications of adjectives into non-gradable (*dead, former*) and gradable adjectives (of different sorts; e.g. *clean, tall*) (Kennedy, 2001), and also for classifying prepositions, as I show below. The relevant categorial generalization is stated in (2):

- (2) Categories encoding scalar information (P, Adj, V) encode complexity constraints on scales.  
Categories encoding event information (P, Adv, V) encode complexity constraints on events.

Crucially, there are cooccurrence restrictions on lexemes encoding events and scales of differing complexity, and these correlations support (1). Wechsler (2002) notes that non-gradable Adjs may only head result XPs for punctual verbs (*John shot/??beat the outlaw dead*), whereas (maximal endpoint closed scale) gradable Adjs may occur with durative verbs (*John wiped the table clean*). I show similar restrictions for prepositions. *To*-PPs may occur with durative verbs (*John beat the outlaw to death*) and force iterative readings on punctual verbs when possible (*John shot the outlaw to death* necessarily involves multiple shots and thus is durative). However, *to*-PPs may not cooccur with non-iterable punctual verbs (*??She stunned him to silence*). *Into*-PPs occur with both punctual and durative verbs (*She stunned/beat him into silence*). Inherent change-of-state verbs, which encode events and scales without overt scalar XPs, also show complexity correlations supporting (1). In (3) the durativity of the event correlates to the complexity of the (understood) path:

- (3) (a) [In a context of John standing just outside the entrance of a cave]  
John entered the cave (\*in/for 30 seconds).
- (b) [In a context of John standing outside a tunnel that leads into the cave]  
John entered the cave in 30 seconds.

In (3a) the path is understood pragmatically as minimal (from one location to an adjacent one) and likewise the predicate is understood as punctual (ungrammatical with durational adverbials). In (3b) the same verb is interpreted duratively in the context of an extended path. Non-motion change-of-state shows the same correlation, as shown above for *John noticed the painting* vs. *John built the house*. Finally, (1) (and complexity in general) has cross-linguistic applicability as well. In Japanese, goals of motion may be realized postpositionally by either the adverbial *-made* or the case particle *-ni*, the former but not the latter of which imposes a durativity constraint on the event. This always forces a complex reading of the path of motion, as predicted by (1). Similar effects can be found in French between the goal marking uses of *jusque* vs. *a*, in Spanish between *hasta* vs. *a*, and in Hebrew between the allative markers *el* and *le*.

I formalize (1) in terms of the mereological approach of Krifka, where objects have subparts and form lattices, providing an intuitive basis for complexity correlations. I propose that for a (potential) change-of-state predicate  $P$  over an event  $e$ ,  $P$  entails the existence of a scale of change  $p$  (analogous to and subsuming Krifka's paths) and a homomorphic mapping  $\theta$  between  $e$  and  $p$ . Informally,  $\theta(e, p)$  means all subparts of  $e$  are  $\theta$ -related to subparts of  $p$ , preserving adjacency and mereological complexity, and the smallest final subpart of  $e$  is  $\theta$ -related to the final part (goal/result) of  $p$  (cf. Krifka's Movement Relation ( $MR$ )). As noted above, the crucial distinctions in complexity for change-of-state are punctual/durative events and simplex/complex scales. To this end, I principally distinguish two types of objects: Minimally Complex Objects ( $MCO$ ), which have only two subparts (a beginning and end), and Complex Objects ( $CO$ ), which have at least three (a beginning, middle, and end).

The lexicalization of complexity in (2) for change-of-state is understood in terms of sortal constraints. Durative verbs impose  $CO(e)$ , punctual verbs impose  $MCO(e)$ , and verbs compatible with either reading impose neither. Simplex scale markers (*dead*) impose  $MCO(p)$ , complex scale markers (*to*) impose  $CO(p)$ , and markers compatible with both readings (*into*) impose neither. This formalization of (2) explains the complexity correlation:  $\theta(e, p)$  ensures that  $MCO(e) \leftrightarrow MCO(p)$  and  $CO(e) \leftrightarrow CO(p)$ ; therefore durative readings of verbs may only cooccur with scale markers allowing complex scales and punctual readings may only occur with scale markers allowing simplex scales. This extension of the mereological approach in Krifka (1998) homogeneously captures the correlation in (1) and lexical encodings in (2), contra heterogeneous explanations based on incremental themes and paths. It also provides a framework for making more fine-grained distinctions, since the generality of mereological relationships allows for complexity types beyond  $CO$  and  $MCO$  relevant for other change-of-state phenomena such as degree achievements and other aspectual classes in general.

## References

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