

The Ontology of Empty Pluralities and Heterogeneity of Pluralized Predicates in Thai

Nominals modified by the numeral *zero*, [1] and [2] argue, sometimes denote zero-membered pluralities. One expects the structure of the model to be relatively consistent across languages—if one language invests plural nouns with the capacity to include an empty element in their extension, that choice should be available to other languages too. Yet *zero* is a recent arrival in the conceptual toolkit of humanity, and thus also a recent arrival in the lexicons of most languages. That makes it an excellent proving ground for exploring variation in natural language metaphysics (in the sense of Bach 1984). In this paper we propose an analysis of the *zero* in Thai that explains its compatibility with only a restricted set of nouns as a lexical restriction: it is only those nouns that include zero-membered pluralities in their extension.

Zero in Thai does not combine with ordinary nouns as it does in English:

- (1) Rao mee kluay nueng/#soon luuk
 We have banana one/#zero CLAS
 ‘We have one banana/#zero bananas.’

However, *zero* can combine with some measure nouns with varying degrees of success:

- (2) Krueung dum mee nandaan soon kram
 NOUN- drink have sugar zero gram
 ‘The drink has zero grams of sugar.’

However, only certain measure nouns license zero-modification:

- (3) ?? Krueung dum mee aangawhaw soon minlilit
 drink have alcohol zero milliliter
 ‘The drink has zero milliliters of alcohol.’

Bylinina & Nouwen argue that to account of the behavior of *zero* in English, the standard [5]-style conception of plural noun extensions as partial (semi)lattices must be enriched to include as an element a bottom set with no members, in other words, the empty set. This is represented by \perp in B&N. However, expanding a set to include the \perp element is not enough, as that would result in tautologies; it would give rise to an ‘at least’ reading. B&N invoke an exhaustification operator that ensures that *zero* receive an ‘exactly’ reading. All stronger alternatives, on which it receives an at-least reading, are negated (\times is the full-lattice pluralization operator, a zero-compliant cousin to Link’s $*$ operator).

Building on these ideas, our first step is an explanation of the unacceptability of (1). Most nouns in Thai, we argue, don’t allow full-lattice pluralization and only allow the partial-lattice form, and so they are incompatible with *zero*. More concretely, we assume Thai nouns inherently denote kinds (in the spirit of [3]), and are mapped onto properties of countable pluralities by classifiers. Because the distinction between $*$ and \times is analytically important here, we will depart from Chierchia in assuming that his \cup operator requires an independent pluralizer to yield a plural property, as in the schematic classifier denotation in (4) (which suppresses irrelevant presuppositions). Following [4], we assume nouns head-move over a classifier and a numeral, as in (5), which delivers the underlying constituency and denotation in (6):

- (4) $\llbracket \text{CLAS} \rrbracket = \lambda x^k \lambda y . * \cup x^k(y)$
 (5) $\llbracket \text{‘banana’}_i \llbracket \text{‘zero’} \llbracket \text{CLAS } t_i \rrbracket \rrbracket$
 (6) $\llbracket \text{‘zero’ CLAS ‘banana’} \rrbracket = \lambda P_{\langle e, t \rangle} . \exists x [\#x = 0 \wedge * \cup \mathbf{banana}(x) \wedge P(x)]$

The denotation in (6) cannot be satisfied because the first conjunct requires a cardinality of zero and the second invokes the classic Linkian pluralization operator that fails to include a zero element. As for measure terms, it's standard to cash out their meaning in terms of measure functions rather than pluralities. This is often for expediency, but if taken seriously it would predict a deep analytical difference between 'zero grams' and 'zero bananas'. One way to implement the Thai facts along these lines would be to treat 'gram' as taking a numeral argument in the spirit of [7]:

$$(7) \quad \llbracket \text{'gram'} \rrbracket = \lambda x^k \lambda n \lambda y . \cup x^k(y) \wedge \mu_{grams} = n$$

$$(8) \quad \llbracket \text{'zero' 'gram' 'sugar'} \rrbracket = \lambda x . \cup \mathbf{sugar}(x) \wedge \mu_{grams}(x) = 0$$

But in Thai, most measure terms can't take zero. One could accommodate this by simply stipulating that all those measure terms have a presupposition that there exists a non-zero amount of the measured individual. This, however, suggests that the zero-compatible measure phrases are the simpler or unmarked form. It also leaves the connection to zero modification outside of measure phrases obscure. Given the syntax of (2), we instead propose an analysis under which measure terms resemble classifiers. Just as a classifier may presuppose that atoms of an individual have e.g. a certain shape, measure terms presuppose that atoms have a certain measure:

$$(9) \quad \llbracket \text{'gram'} \rrbracket = \lambda x^k \lambda y : \forall z \preceq {}^{\times \cup} x^k [\text{ATOM}(z) \rightarrow \mu_{gram}(z) = 1] . {}^{\times \cup} x^k(y)$$

$$(10) \quad \llbracket \text{'zero' 'gram' 'sugar'} \rrbracket = \lambda y : \forall z \preceq {}^{\times \cup} \mathbf{sugar} [\text{ATOM}(z) \rightarrow \mu_{gram}(z) = 1] . \#y = 0 \wedge {}^{\times \cup} \mathbf{sugar}(y)$$

$$(11) \quad \llbracket \text{'milliliter'} \rrbracket = \lambda x^k \lambda y : \forall z \preceq {}^{*\cup} x^k [\text{ATOM}(z) \rightarrow \mu_{ml}(z) = 1] . {}^{*\cup} x^k(y)$$

Crucially, there are two different notions of pluralization here. 'Gram' has simply accepted full-lattice form, unlike classifiers and most other measure terms.

Of course, this doesn't suffice as a theory of the relation between measure phrases and plurals. The core insight is rather that examining the use of *zero* across languages may provide a useful window onto this territory because *zero* is an element that is relatively novel in all languages, and one that makes substantial ontological demands of them. The lexical idiosyncrasy in Thai may be a reflection of a language change in progress. It also reflects how the state of affairs [1] envision may arise, a few lexical items at a time and perhaps from a particular corner of the grammar (measure phrases). To the extent that our approach is successful, it is evidence for their basic claim. It may also constitute further evidence for making the analytical link between measure phrases and other NPs more explicit. Finally, the Thai facts—in their idiosyncrasy and their variation among speakers—may provide an illustration of how what [8] called a grammatical virus arises in the semantics ([6]): a particular lexical item (*zero*), initially limited in its use, imposes special semantic requirements that gradually but unstably reverberate across the grammar.

References

- [1] Bylinina/Nouwen. 2017. 'On 'zero' and semantic plurality', *Proceedings of SALT*. [2] Chen. 2018. 'Zero degrees: numerosity, intensification, and negative polarity'. *Proceedings of CLS*. [3] Chierchia. 1998. 'Reference to kinds across languages'. *Natural Language Semantics*. [4] Jenks. 2011. *The Hidden Structure of Thai Noun Phrases*. diss., Harvard. [5] Link. 1983. 'The logical analysis of plurals and mass terms: A lattice-theoretical approach'. *Meaning, Use, and Interpretation of Language*. [6] Morzycki. 2017. 'Some viruses in the semantics'. *A Schriift to Fest Kyle Johnson*. [7] Scontras. 2014. *The Semantics of Measurement*. diss., Harvard. [8] Sobin. 1996. 'Agreement, default rules, and grammatical viruses'. *Linguistic Inquiry*.