# From *zero* to bigger things: numerality, intensification, and NPI licensing

Sherry Yong Chen (MIT) | sychen@mit.edu

This paper argues that *zero* has a second meaning as a degree quantifier, in additional to the numeral meaning explored in Bylinina and Nouwen (2017). It further suggests that scale boundaries are key to providing a more general theory of intensification that connects numerals and degree modification.

**Numeral Zero** The Generalized Quantifier Theory uses set relations to treat *zero* on a par with the negative quantifier *no*, predicting the two to be semantically equivalent (Barwise & Cooper, 1981). However, it has been noted that *zero* and *no* differ in terms of negative inversion and licensing (Déprez, 1999; Gajewski, 2011; Moltmann, 1995). Recently, Bylinina and Nouwen (2017) observe that *zero* contrasts with *no* in terms of NPI licensing:

(1)     No/* Zero students *ever* say anything.

They argue that *zero* is not a quantifier and should be treated just as other numerals in order to capture its weak negative quantificational force. But given the range of theoretical possibilities concerning the status of *zero*, it seems only reasonable to also compare it with other numerals. While Bylinina and Nouwen's analysis focuses only on plural count nouns, the modification of *zero* with other types of nouns sheds new light on its meaning(s).

**Intensifier Zero** In another life, *zero* has an intensifier meaning based on key observations about its modification of abstract nouns, which typically have a degree adjective counterpart (Morzycki, 2009).

Furthermore, *zero* exhibits two characteristic properties of an intensifier: first, *zero-N* must follow the unintensified form, as in many well-studied intensification constructions:

(2)     a.   The justice department revealing it has found no evidence, *zero* evidence that Donald Trump tower was ever wire-tapped as the President has alleged the series of tweets.                                              (CNN Newsroom)
        b.   Iraq vote is close, *real* close.                                              (Politico)
        c.   But he was crazy about her. Like *crazy crazy*.          (Discretion: A Novel)

Second, the negation of *zero-N* is compatible with the unintensified form, in line with Beltrama and Bochnak's (2015) observation:

(3)     McEwen is cautious about the chances of seeing the missing lander this way, giving it a "small but *not zero*" chance of success.                                              (Nature)

(4)     Travelers who have no measured fever, and have been determined to have low, but *not zero* risk will be released.                              (Virginia Department of Health)

Crucially, in the above examples, *zero* can be conjoined with a degree adjective in a way that no other numerals can, which is again surprising if *zero* is just a regular numeral. Note also that only negative degree adjectives can be conjoined with *zero*, contrasting with other intensifiers whose scale is contextually determined by the null degree morpheme *POS* (von Stechow, 2009).

**NPI Licensing** Contrary to the claim made in Bylinina & Nouwen, it is not the case *zero*-DPs never license NPIs. For example:

(5)  a.  Mary showed *zero* interest in anything to do with boys.
   b.  Julia has *zero* tolerance for even the slightest disagreement.

Crucially, Bylinina & Nouwen's generalization is empirically inadequate because it's confounded with the syntax. Instead, *zero*-DPs in the object position but not the subject position do license NPIs.

**Analysis** Following Morzycki (2009), I assume abstract nouns are gradable predicates of type $\langle d, et \rangle$, just like their degree adjective counterparts:

(6)  $[\![ N_{<d,et>} ]\!] = \lambda d. \lambda x. P(x) \wedge \mu_S(x) \geqslant d$

*Zero* is a degree quantifier of type $\langle dt, t \rangle$. Its meaning is modelled on *POS*, but instead of assuming a "neutral range" $N$ on the scale $S$, *zero* takes the full range $F$ on a reversed scale $S$ that goes from larger degrees to smaller degrees, with the endpoint being 0. By including 0 in the scale, this move is analogous to introducing the full lattice in Bylinina & Nouwen's theory of plurality.

(7)  $[\![ zero_{<dt,t>} ]\!] = \lambda I_{<d,t>}. \forall d \in F_S. I(d)$

Note that since N takes a degree as its argument and *zero* is a degree quantifier, *zero* will have to QR, leaving behind a trace of type $d$. Taking *Zero evidence was found* as a simple example, I show the (abridged) compositional analysis of a *zero*-sentence as follows:

(8)  $[\![ [_{DP} \varnothing \; t_1 \; \text{evidence}] ]\!] = [\![ N ]\!] (d_1)$
   $= \lambda x. \text{evidence}(x) \wedge \mu_S(x) \geqslant d_1$                                            **by FA**
   $[\![ [_{IP} \varnothing \; t_1 \; \text{evidence was found}] ]\!] = ( [\![ t_1 \; \text{evidence} ]\!] )( [\![ \text{was found} ]\!] )$
   $= \lambda x. \text{evidence}(x) \wedge \mu_S(x) \geqslant d_1 \wedge \text{found}(x)$               **by PM**
   $\Rightarrow \exists x. \text{evidence}(x) \wedge \mu_S(x) \geqslant d_1 \wedge \text{found}(x)$             **by ∃C**
   $\Rightarrow \lambda d_1 \exists x [\text{evidence}(x) \wedge \mu_S(x) \geqslant d_1 \wedge \text{found}(x)]$        **by PA**
   $[\![ [_{IP} [\text{zero}][\varnothing \; t_1 \; \text{evidence was found}]] ]\!]$
   $= \forall d \in F_S[\exists x [\text{evidence}(x) \wedge \mu_S(x) \geqslant d \wedge \text{found}(x)]$       **by FA**

Essentially, the sentence is true iff the amount of evidence that was found is greater than all degrees on $S$, which must be the numerically smallest degree 0 since $S$ is a reversed scale.

**Implications** The intensifier analysis of *zero* is not only empirically motivated but also illuminating. A degree quantifier analysis of *zero* can also be extended to plural count nouns, based on which the NPI licensing facts can be explained. In addition, we offer a pragmatic account for the intensifying effects observed for *zero*, with reference to scalar alternatives and domain restriction.s

**Selected references** Barwise, J. & Cooper, R. (1981). Generalized quantifiers and natural language. • Beltrama, A. & Bochnak, M. R. (2015). Intensification without degrees cross-linguistically. • Bylinina, L. & Nouwen, R. (2017). On "zero" and semantic plurality. • Morzycki, M. (2009). Degree modification of gradable nouns: size adjectives and adnominal degree morphemes. • von Stechow, A. (2009). The temporal degree adjectives früh(er)/spät(er) 'early(er)'/'late(r)'.