

The two lives of *zero*: numeral, intensification, and NPI licensing

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This paper argues that *zero* has a second meaning as a degree quantifier, in addition 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 con-founded 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:

$$(6) \quad \llbracket N_{\langle d, et \rangle} \rrbracket = \lambda d. \lambda x. P(x) \wedge \mu_S(x) \geq d$$

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.

$$(7) \quad \llbracket zero_{\langle dt, t \rangle} \rrbracket = \lambda I_{\langle d, t \rangle}. \forall d \in F_S. I(d)$$

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:

$$(8) \quad \begin{aligned} \llbracket [DP \ \emptyset \ t_1 \text{ evidence}] \rrbracket &= \llbracket N \rrbracket (d_1) && \\ &= \lambda x. \text{evidence}(x) \wedge \mu_S(x) \geq d_1 && \text{by FA} \\ \llbracket [IP \ \emptyset \ t_1 \text{ evidence was found}] \rrbracket &= (\llbracket t_1 \text{ evidence} \rrbracket) (\llbracket \text{was found} \rrbracket) \\ &= \lambda x. \text{evidence}(x) \wedge \mu_S(x) \geq d_1 \wedge \text{found}(x) && \text{by PM} \\ &\Rightarrow \exists x. \text{evidence}(x) \wedge \mu_S(x) \geq d_1 \wedge \text{found}(x) && \text{by } \exists C \\ &\Rightarrow \lambda d_1 \exists x [\text{evidence}(x) \wedge \mu_S(x) \geq d_1 \wedge \text{found}(x)] && \text{by PA} \\ \llbracket [IP \ [zero] [\emptyset \ t_1 \text{ evidence was found}]] \rrbracket &&& \\ &= \forall d \in F_S [\exists x [\text{evidence}(x) \wedge \mu_S(x) \geq d \wedge \text{found}(x)]] && \text{by FA} \end{aligned}$$

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)’.