From zero to bigger things: numerality, intensification, and NPI licensing
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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 that 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) \(\llbracket \text{N} < d, et \rrbracket = \lambda d. \lambda x. P(x) \land \mu_S(x) \geq d\)

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) \(\llbracket \text{zero} < dt, t \rrbracket = \lambda I < d, t \rrbracket. \forall d \in F.S. I(d)\)

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)
\[
\llbracket \text{DP} \varnothing t_1 \text{ evidence} \rrbracket = \llbracket \text{N} \rrbracket (d_1) = \lambda x. \text{evidence}(x) \land \mu_S(x) \geq d_1 \\
\llbracket \text{IP} \varnothing t_1 \text{ evidence was found} \rrbracket = (\llbracket t_1 \text{ evidence} \rrbracket \big) (\llbracket \text{was found} \rrbracket) = \lambda x. \text{evidence}(x) \land \mu_S(x) \geq d_1 \land \text{found}(x) \\
\Rightarrow \exists x. \text{evidence}(x) \land \mu_S(x) \geq d_1 \land \text{found}(x) \quad \text{by PM} \\
\Rightarrow \lambda d_1 \exists x [\text{evidence}(x) \land \mu_S(x) \geq d_1 \land \text{found}(x)] \quad \text{by } \exists C \\
\llbracket \text{IP} [\text{zero} \varnothing t_1 \text{ evidence was found}] \rrbracket = \forall d \in F.S. [\exists x [\text{evidence}(x) \land \mu_S(x) \geq d \land \text{found}(x)] \quad \text{by FA}
\]

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 restrictions.