Title: On the Ambiguity and Unambiguity of Superlative Modifiers

Synopsis: Superlative modifiers (SMs) recently have received intensive investigation (e.g., Krifka 1999, Geurts & Nouwen 2007, Nouwen 2010, Coopock & Brochhagen 2013, Kennedy 2015). However, most studies center on English and little attention was paid to the (un)ambiguity of SM. Two notable exceptions are Nakanishi & Rullmann (2009) (N&R) and Biezma (2013). N&R observes that English *at least* can be ambiguous between epistemic reading (EPI) and concessive reading (CON). In (1a), the speaker is uncertain about the quantity of novels Mary wrote. In (1b), the speaker *knows* how many novels Mary wrote and conveys that writing four novels is less preferable but still satisfactory.

(1) a. Mary wrote ***at least*** [four novels]$_F$. (EPI)

b. Although Mary didn't write five novels, ***at least*** she wrote [four novels]$_F$. (CON)

Two novel observations are made in this study: **(i)** Like English *at least*, *zhishao* 'at least' in Mandarin is also ***ambiguous***; **(ii)** by contrast, Chinese *zuiduo* 'at most' and its English counterpart *at most* are ***unambiguous***. Consider examples (2)-(4).

(2) *Zilu*   ***zhishao***   *xie-le*   [*si-ben-xiaoshuo*]$_F$.   (EPI or CON)

Zilu   at-least   write-ASP   four-CL-novel

'Zilu at least wrote [four novels].'

(3) *Zilu*   ***zuiduo***   *xie-le*   [*si-ben-xiaoshuo*]$_F$.   (EPI)

Zilu   at-most   write-ASP   four-CL-novel

'Zilu at most wrote four novels.'

(4) a. Lee ***at most*** wrote [four novels]$_F$. (EPI)

In (2), EPI conveys that the speaker is *uncertain* about the quantity of novels *Zilu* wrote, while CON that the speaker *knows* exactly how many novels *Zilu* wrote and writing four novels is satisfactory. By contrast, (3) and (4) can only convey the speaker's *uncertainty* about the quantity of novels *Zilu* wrote.

N&R and many others consider EPI and CON as two different lexical entries of *at least* in English. Surprisingly, such ambiguity is reminiscent of modal polysemy and repeats itself across a wide range of languages (see N&R for Japanese *sukunaku-to-mo*, Dutch *tenminste*; see Grosz 2011 for Greek *tulachiston*, Hebrew *le-faxot*, Czech *aspoň*, Spanish *al menos*). As a bottom line, cross-linguistic data such as (2)-(4) not only pose a challenge to the view of pure lexical ambiguity but also raise two important questions: Cross-linguistically, (i) Why are *zhishao* and *at least* **ambiguous**? (ii) Why are *zuiduo* and *at most* **unambiguous**? This study provides a semantics-pragmatics answer based on Mandarin, with the hope that the current analysis can be extended to other languages.

Building on Biezma (2013)'s insight that CON is a pragmatic variant of EPI when the relevant higher alternatives are known to be false in the context, the central ideas of this study are twofold: **(i)** the ambiguity arises with *zhishao* because the relevant higher alternatives ***can*** be left open or known to be false; **(ii)** *zuiduo* do not reveal the ambiguity due to the <u>convergence</u> of its semantics and the pragmatic requirement of CON, namely, the relevant higher alternatives ***must*** be (known to be) false. Since Biezma (2013) is the only uniform analysis I am aware of, for expository purposes, I adopt her formalization of SMs as disjunction, leaving open the implementation within other approaches to SMs.

Zhishao: Assume that **(i)** SMs are focusing adverbs; **(ii)** they are sentential operators for simplicity,

otherwise we need type-shifting rules (e.g., Beaver & Clark 2008, Coppock & Brochhagen 2013); **(iii)** the Roothian focus semantics that focus alternatives project until they meet the focus operator (Rooth 1985, 1992) and they are interpreted by squiggle operator ~ and restricted by a contextual variable C. The lexical entry of *zhishao* 'at least' is provided in (5). The LF and semantics of (2) are given in (6):

(5) a. Let p be a proposition, and $[p]_{A,i}$ the set of alternatives of p ordered according to $\leq_i$,

where $\leq_i$ is a contextually salient order of alternatives and $\forall \pi \in [p]_{A,i}$, $\pi \in C$:

$[\![zhishao\ p]\!] = \lambda w.\exists q, r \in [p]_{A,<i}$, s.t. $r <_i p <_i q$ & $[p(w) \vee q(w)]$ & $\forall s \in [p]_{A,i}, s <_i p [\neg s(w) \vee p$ entails $s]$

b. Given a contextual ordering $r <_i p <_i q$, "*zhishao p*" asserts that the prejacent p or its relevant higher alternatives q are true and that those relevant lower alternatives s (that are not entailed by p) are false.

(6) a. LF: [IP ***Zhishao*** (C) [IP *Zilu* wrote [four novels]F] ~C]

b. Given the ordering on numeral scale, $[\![(2)]\!] = 1$ in w iff *Zilu* wrote four novels in w (the prejacent) or *Zilu* wrote more than four novels in w (the relevant higher alternatives) are true and that *Zilu* wrote no novels in w..etc (the relevant lower alternatives) are false.

Zhishao requires the lower alternatives to be false and *leaves open* whether the higher alternatives are true. When the latter are contextually known to be false, CON arises and the prejacent is thus entailed.

Zuiduo: The lexical entry of *zuiduo* 'at most' is given in (7). The LF and semantics of (3) are in (8):

(7) a. Let p be a proposition, and $[p]_{A,i}$ the set of alternatives of p ordered according to $\leq_i$,

where $\leq_i$ is a contextually salient order of alternatives and $\forall \pi \in [p]_{A,i}$, $\pi \in C$:

$[\![zuiduo\ p]\!] = \lambda w.\exists q, r \in [p]_{A,<i}$, s.t. $r <_i p <_i q$ & $[p(w) \vee r(w)]$ & $\forall s \in [p]_{A,i}, p <_i s [\neg s(w)]$

b. Given a contextual ordering $r <_i p <_i q$, "*zuiduo p*" asserts that the prejacent p or its relevant lower alternatives r are true and that **those relevant higher alternatives s are false**.

(8) a. LF: [IP ***Zuiduo*** (C) [IP *Zilu* wrote [four novels]F] ~C]

b. Given the ordering on numeral scale, $[\![(3)]\!] = 1$ in w iff that *Zilu* wrote four novels in w (the prejacent) or *Zilu* wrote less than four novels in w (the relevant lower alternatives) are true and **that _Zilu_ wrote more than four novels in w (the relevant higher alternatives) is false**.

Crucially, in contrast to *zhishao*, *zuiduo* requires the relevant higher alternatives to be *false* in its semantics. Specifically, the semantics of *zuiduo* and the pragmatic condition of CON **converge** on requiring the relevant higher alternatives to be false. Therefore, no ambiguity arises with *zuiduo*.

Implications: If the (un)ambiguity of SMs is indeed a consequence of the semantics-pragmatics interaction, ceteris paribus, this study makes two predictions: **(i)** *zhishao* and its cross-linguistic kin **_CAN_** be pragmatically ambiguous, **(ii)** while *zuiduo* and its cross-linguistic kin **_CANNOT_** be. The prediction (i) seems already borne out. It remains to see whether the prediction (ii) also holds in those languages. Finally, more studies are needed to see how the core ideas here can be connected with the antonymous relation of SMs and their relation to superlatives. This study takes the first step toward broadening our cross-linguistic understanding of SMs and completing our current theories of SMs.

Selected Ref. [1] Nakanishi, K. & H. Rullmann 2009. Epistemic and concessive interpretation of *at least*. **[2]** Biezma, M. 2013. Only one at least: refining the role of discourse in building alternatives.