Toward A Unified Account of Superlative Modifiers
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Introduction: Nakanishi & Rullmann (2009) (N&R) observes that English *at least* can be ambiguous between an epistemic reading (EPI) and a concessive reading (CON). For example, (1a) conveys the speaker's uncertainty about what medal Mary has won; (1b) conveys the speaker's concession: the medal that Mary has won is *known* to the speaker and while satisfactory, is less than optimal.

(1) a. Mary won ***at least*** a [silver]$_F$ medal. **[EPI]**
 b. Although Mary didn't win any gold medal, she ***at least*** won a [silver]$_F$ medal. **[CON]**

This paper presents four pieces of evidence arguing for a unified account of the two meanings in Chinese. First, Chinese has more than one lexical item that can be ambiguous between CON and EPI. (2) is *felicitous* as a continuation to both contexts (3a-b). The position of the focus associate makes explicit the piece of information that the speaker's **uncertainty/ concession** is about.

(2) *Lisi* ***zuishao/ zhishao/ qima*** *na-le* *yi-mian-[yin]$_F$-pai.* **[Lexical Scale]**
 Lisi at least/ ZHISHAO/ QIMA take-ASP one-CL-silver-medal
 'Lisi at least got a silver medal.'

(3) Contexts
 a. **EPI**: I don't know exactly what medal *Lisi* has won. But I think…
 b. **CON**: Although *Lisi* didn't win a gold medal (achieve his goal)…

Second, both readings are focus-sensitive and compatible with a variety of scales.

(4) a. *Lisi* ***zuishao/ zhishao/ qima*** *xie-le* *[san]$_F$-ben-xiaoshuo.* **[Numerical Scale]**
 Lisi at least/ ZHISHAO/ QIMA write-ASP three-CL-novel
 'Lisi at least wrote three novels.' (a contextual ranking: e.g., *4 > 3 > 2*)

 b. *Lisi* ***zuishao/ zhishao/ qima*** *yaoqing-le* *[Adam he Bill]$_F$.* **[Cardinality Scale]**
 Lisi at least/ ZHISHAO/ QIMA invite-ASP Adam and Bill
 'Lisi at least invited Adam and Bill.' (a contextual ranking: e.g., $a \oplus b \oplus c > a \oplus b > a$)

 c. *Lisi* ***zuishao/ zhishao/ qima*** *mai-le* *[pingguo]$_F$.* **[Pragmatic Scale]**
 Lisi at least/ ZHISHAO/ QIMA buy-ASP apple
 'Lisi at least bought apples.' (a contextual ranking: e.g., *cherries > apples > bananas*)

Third, both readings show the bottom-of-the-scale effect (BSE): the associate cannot be the element at the bottom of the scale. In the scenario (5), (6) is *infelicitous* as a continuation to both contexts (5b-c).

(5) Scenario: Adam, Bill and *Lisi* are playing dice. Whoever gets a bigger number wins. A dice has six numbers on it: **Six** is the upper bound and **one** the lower bound on the possible results. *Lisi* threw the dice but Adam missed the result. During his turn, he asked about what the result was.

 a. Adam: What number did *Lisi* get?
 b. Bill: I don't know exactly what number *Lisi* got. But I think…
 c. Bill: Although *Lisi* didn't get 2, 3, 4, 5 or 6 (any number bigger than 2)…

(6) # *Lisi* ***zuishao/ zhishao/ qima*** *shai-le* *[yi]$_F$.* **[Bottom-of-the-Scale Effect (BSE)]**
 Lisi at least/ ZHISHAO/ QIMA dice-ASP one
 'Lisi at least got one.'

Fourth, both readings show a mirror image of BSE, namely, the top-of-the-scale effect (TSE): the associate cannot be the element at the top of the scale. In the same scenario (5), (7) is *infelicitous* as a continuation to the question (5a), regardless of CON or EPI.

(7) # *Lisi* ***zuishao/ zhishao/ qima*** *shai-le* *[liu]$_F$.* **[Top-of-the-Scale Effect (TSE)]**
 Lisi at least/ ZHISHAO/ QIMA dice-ASP six
 'Lisi at least got six.'

This paper proposes an analysis that not only unifies the two meanings but also derives the facts above. The central proposals of this paper are three-fold: **(i)** The three items, *zuishao/ zhishao/ qima*, are scalar focus particles and share one semantic core; **(ii)** CON is a pragmatic variant of EPI: CON arises when the speaker knows the relevant higher alternatives to be false (see Biezma 2013 for English *at least)*; **(iii)** TSE results from semantic triviality while BSE from discourse uninformativity.

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The semantic core and EPI-CON ambiguity: For expository purposes, let us assume **(i)** the three items are propositional operators; **(ii)** focus alternatives project until they meet the focus operator, where they are interpreted by the squiggle operator ~ and restricted by a contextual variable C (Rooth 1985, 1992). The semantic core is given in (8). The LF and truth-conditions of (2) are provided in (9).

(8) $[\![\textbf{\textit{zhishao}}]\!] = \lambda C_{<st,t>}.\ \lambda p_{<st>}.\lambda w_{<s>}.\exists q\ [q \in C \wedge q \geq_i p \wedge q(w)]$
There is a proposition q in C which is stronger than or equally strong as the prejacent p such that q is true in w

(9) a. LF: $[_{IP}$ **Zhishao** (C) $[_{IP}$ Lisi won a [silver]$_F$ medal] ~C]
   b. $[\![(2)]\!] = 1$ in *w* iff that *Lisi* won a silver medal in *w* (the prejacent) is true or
      that *Lisi* won a gold medal in *w* (the higher alternative) is true.

$\geq_i$ is a contextually given ranking among the set of focus alternatives. The semantic core of the three scalar particles is to make the prejacent the lower bound and ***leave open*** whether the relevant higher alternatives are true. When the relevant higher alternatives are contextually known to be false (to the speaker), CON arises. The prejacent is thus *entailed* under CON (in contrast to EPI). The EPI-CON ambiguity arises since the relevant higher alternatives **CAN** be left open **OR** known to be false.

Deriving TSE and BSE: Recall that both readings show TSE and BSE. The semantic core (8) requires the *existence* of some contextually relevant higher alternatives; if not fulfilled, the semantic contribution of the scalar particles becomes trivial: *the only existing alternative that is as strong as the pejacent is the prejacent itself*. In the scenario (5), the utterance (7) is infelicitous because it leads to **semantic triviality**: no relevant higher alternatives exist in the first place because the associate (the number *six*) is the upper bound. In the same scenario (5), the utterance (6) is infelicitous because it is **contextually uninformative**: it is known that only six results are possible and the number *one* is the lower bound. Crucially, the utterance (6) becomes *felicitous* once it is understood in a way that the speaker is joking or being sarcastic about *Lisi*: the speaker is being *intentionally uncooperative* and *flouting the maxim of quantity* (Grice 1975, 1989). In short, (8) predicts TSE and BSE to be of different nature: TSE results from semantic triviality while BSE from discourse uninformativity. This is evidenced by the fact that BSE, but not TSE, can be *repaired* by pragmatic strategies.

Implications: Cross-linguistically, superlative modifiers (like English *at least*) in general show the EPI-CON ambiguity (see N&R for Japanese *sukunaku-to-mo*, Dutch *tenminste*; see Grosz 2011 for Greek *tulachiston*, Hebrew *le-faxot*, Czech *aspoň*, Spanish *al menos*). Moreover, Chinese may not be the only language having more than one lexical item ambiguous between EPI and CON. These cross-linguistic facts together strongly suggest that the two meanings cannot simply be a case of lexical coincidence in natural languages. Instead, the two meanings EPI and CON are systematically and intrinsically related. Based on Chinese, this study proposes a uniform semantic representation that not only captures the relation between EPI and CON, but also predicts the two effects: TSE and BSE. As far as we are aware, TSE is a novel finding and the two effects have not been investigated in the literature on superlative modifiers. If the current analysis is correct, both TSE and BSE are expected to appear with those scalar items showing the EPI-CON ambiguity in any language.

Extensions: An important insight from N&R is that the syntactic distribution of focus particles plays a role in the availability of EPI vs. CON. In (10a), CON is the only reading when the three scalar particles occur sentence-initially; in (10b), EPI is the only reading when the three occur pronominally.

(10) a. ***Zuishao/ Zhishao/ Qima*** *Lisi* [*qipian-le* *Zilu*]$_F$.   **[CON, #EPI]**
      At least ZHISHAO QIMA Lisi deceive-ASP Zilu
      'At least, Lisi deceived Zilu.'
   b. *Lisi* *xie-le* ***zuishao/ zhishao/ qima*** [*san*]$_F$*-ben-xiaoshuo*.   **[#CON, EPI]**
      Lisi write-ASP at least/ ZHISHAO/ QIMA three-CL-novel
      'Lisi wrote at least three novels.'

In the full version of this study, we show that **(i)** the distribution of CON results from the requirement of speaker concession that the quantificational domain needs to be (minimally) propositional (sets of worlds/ situations); **(ii)** the distribution of EPI is reminiscent of that of other focus particles such as English *only* and *even*: In sentence initial position, they can only associate with *the subject*, not the predicate or the whole proposition.