Exhaustivity in Mandarin *shi . . . (de)* (SD) clefts: Experimental evidence

Summary We present two experiments examining how Mandarin *shi . . . (de)* cleft sentences [1] (henceforth SD clefts, (1)) encode *exhaustive inference* (i.e. the meaning "No one besides Sue is late" in the examples) against two other constructions: restrictive particle *zhi* "only" (2), and Plain Focus sentences (3). Previously, scholars agree that *only* asserts while Plain Focus sentences conversationally implicates exhaustivity, but cleft receives some controversies: some considered it an assertion, on a par with *only* (e.g. É Kiss 1998, Lee 2005, Cheng 2008), as part of presupposition (Velleman et.al. 2012 a.o.), or a conversational implicature (e.g. Horn 1981). In this context, we propose to address two issues with experimental data from Mandarin: (i) to evaluate whether Mandarin *shi . . . (de)* sentences encode exhaustivity, and if the answer is yes (ii) to evaluate the above proposals on the exhaustivity of clefts. Through Exp. 1, we can see that SD clefts indeed encode exhaustivity, and moreover its exhaustivity is perceived differently than that of *zhi* "only". Then we use Exp. 2 to further demonstrate that exhaustivity of clefts cannot be canceled by "In fact" continuation, suggesting that this meaning component is not a conversational implicature.

(1) Shi Sue chidao-le.
SHI Sue late-ASP
"It is Sue who was late."

(2) Zhiyou Sue chidao-le.
Only Sue late-ASP
"Only Sue was late."

(3) *Who was late?*
[Sue]$_F$ chidao-le.
Sue late-ASP.
"[Sue]$_F$ was late."

Experiment 1 addresses two questions: (i) whether Mandarin cleft sentences encode exhaustivity, and (ii) if they do, is exhaustivity of clefts comprehended in the same way as exclusive particles like *zhi* "only". METHODS We adopt an inference judgment task, in which 60 Mandarin speakers were asked to hear a cleft sentence, an *zhi* "only" sentence or a simple sentence, and rate the acceptability of an exhaustive inference from the audio stimuli. An example testing scenario is given in (4), in which Wang Ming's utterance is the audio stimuli while David's thought is an exhaustive inference. Participants were responsible for judging this inference on a scale of 1 to 5 (1= extremely unacceptable) against the audio stimuli and the context. RESULTS All items were assigned to six lists in a Latin square fashion, and the mean acceptability to exhaustive inference is shown in Fig 1. One-way ANOVA reveals that the difference among the three types of sentences is statistically significant ($F = 137.9, p = 0.000$); a post-hoc Bonferroni test suggests that the mean acceptability to exhaustivity of SD clefts (3.95) was significantly lower than that of *zhi* "only" ($4.62, p = 0.000$), while higher than that of simple sentences ($2.95, p = 0.000$). It then can be concluded that Mandarin cleft sentences indeed carry exhaustive inferences, and that speakers treat exhaustive inference in clefts and *zhi* "only" sentences differently, suggesting that the exhaustivity of clefts is not part of the construction's assertion content. Next we will evaluate the conversational implicature proposal of cleft exhaustivity.

(4) *Wang Ming went off to buy drinks for his friends. When he came back from the store, he said:*
Bianlidian li, shi hongcha maiwan le.
Convenient store LOC SHI black tea sold-out ASP
"In the store, it was the black tea that was sold out." *Audio stimuli*
→ David's thought: "So, other drinks were not sold not." *Testing inference*

Experiment 2 takes advantage of the cancelability feature: a conversational implicature can be canceled by a contradicting statement introduced by "in fact . . . " (Grice 1975). Applied to our case, a conversationally implicated exhaustive inference, such as that of Plain Focus sentences (e.g. Onea and Beaver 2011)

[1] By *shi . . . (de)* sentences, we target at both the bare *shi* pattern and *shi. . . (de)* pattern recognized in literature. We agree with previous analyses that there are certain syntactic differences concerning these two patterns, however, we hold that both structures carry an existential presupposition, an identificational assertion and an exhaustivity inference, therefore their semantics could be analyzed the same. As these are the focus of our discussion, we will use *shi. . . (de)* to refer to these two structures in this abstract.

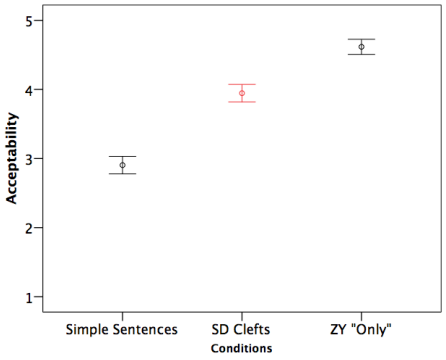

Figure 1: Acceptance to exhaustive inference (means with confidence intervals 95%)

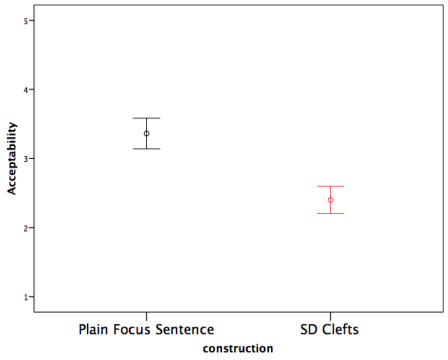

Figure 2: Cancelling exhaustivity (means with confidence intervals 95%)

should be cancelable, i.e. when followed by "In fact, someone else did that too", the sentence is still felicitous. If exhaustivity of clefts is a conversational implicature, the cancelation test results would be the same for the two types of sentences. METHODS We adopt a felicity-judgment task, in which 35 native speakers were presented with a conversation ended with a *wh*-question, and then were asked to rate the felicity of its answer in the form of [Plain Focus sentence/ SD clefts + *In fact* ... *also* ...] on a scale of 1 to 5 (1= extremely infelicitous), as exemplified by (5). All items were assigned to 3 lists in a Latin square fashion. PREDICTIONS As stated above, if exhaustivity is a conversational implicature in SD clefts and Plain Focus sentences, the sentence with "in fact ..." continuation would be judged as felicitous. Otherwise, exhaustivity of SD clefts is not part of conversational implicature. RESULTS As shown in Fig 2, the mean acceptability to "in fact" continuation differs across constructions, and this difference was statistically significant as determined by one-way ANOVA ($F = 76.345, p < 0.01$). A post-hoc Bonferroni test suggests the acceptability to this cancellation continuation of Plain Focus sentences (3.4) was significantly higher than SD clefts ($2.4, p = 0.000$). We can then conclude that exhaustivity of cleft sentences can be cancelled while that of Plain Focus sentences cannot, which suggests that clefts do not encode exhaustivity as a conversational implicature. INTERIM DISCUSSION Horn (*to appear*) among others has argued that the difference regarding the encoding of exhaustivity between cleft and *in situ* prosodic Plain Focus sentence is connected to existential presupposition. However, in this experiment, Plain Focus sentences elicited by *wh*-questions, which evokes existential presupposition, still deviates from SD clefts in contexts in favor of exhaustivity. Other researchers like DeVeaugh-Geiss et al. (2015) tried to use factors like focus projection as an explanation. However, Plain Focus sentences as answers to *wh*-questions has a fixed focus that cannot project to a larger constituent, the observed difference between *wh*-elicited Plain Focus Sentences and clefts still stands.

(5) *Wang Ming asked David: "Do you know, between Mo Yan and Yu Hua, who has published a novel?" David answered:*
Shi MoYan chuban-guo xiaoshuo; **shishishang, YuHua ye chuban-guo xiaoshuo.**
SHI MoYan publish-ASP novel **In fact, YuHua also publish-ASP novel**
"It is MoYan who has published a novel; **in fact, YuHua has also published a novel.**"

Discussions With the evidence drawn from the above two experiments, we can conclude that (i) Mandarin *shi...(de)* clefts are exhaustive, but (ii) its exhaustivity is not conveyed in the same fashion as that of *zhi* "only" or Plain Focus sentences, meaning that it cannot be an assertion nor a conversational implicature. One possible explanation is to posit exhaustivity in the presupposed content of clefts, but more evidence is needed before we can draw a conclusion. By using cross-linguistic and experimental data, this study contributes to our understanding of Mandarin *shi ... (de)* clefts, as well as the theories on cleft exhaustivity.