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Chinese complex reflexive *ta-ziji* as an exempt anaphor

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Abstract. This study examines whether the complex reflexive *ta-ziji* in Mandarin Chinese can be used as an exempt anaphor. To this end, an offline antecedent choice experiment and an online self-paced reading experiment were conducted to explore whether and how discourse-level factors influence the interpretation of *ta-ziji*. The offline and online experiments provide converging evidence that the logophoric role (source vs. perceiver) of the non-local subject impacts the interpretation of *ta-ziji*. Crucially, the online experiment shows that when the non-local subject is an empathized source, non-local binding is preferred; when it is an empathized perceiver, there is no clear binding preference. The implications of these findings are discussed in relation to linguistic theories of anaphora and logophoricity.

Keywords. Mandarin Chinese; complex reflexive *ta-ziji*; discourse; logophoricity; anaphora resolution

1. Introduction. There are two types of reflexives in Mandarin Chinese (henceforth "Chinese"), the bare reflexive *ziji* ('self') and the complex reflexive *ta-ziji* ('s/he-self'). The latter is morphologically decomposed into the pronoun *ta* ('s/he') and *ziji*. Over the decades, the theoretical linguistics field has been largely concerned with *ziji* which exhibits several intriguing properties. These include exemption from Principle A of the Binding Theory (Chomsky 1981), as long-distance (LD) binding of *ziji* is allowed. Different approaches have been proposed to account for LD binding of *ziji* (see e.g., Han 2020 for a comprehensive review). The emerging consensus is that LD *ziji* is a perspective-sensitive or *logophoric* reflexive (e.g., Huang & Liu 2001; Pan 2001; Wang & Pan 2015a, 2015b; Charnavel et al. 2017; Han 2020; see below for the notion of logophoricity): a perspective center can bind *ziji* from outside the local domain.

In contrast to the LD binding property of *ziji*, it is generally assumed that *ta-ziji* is strictly governed by Principle A (e.g., Battistella 1989; Tang 1989; Cole et al. 1990; Huang & Tang 1991). However, there seem to be empirical challenges to this view, as *ta-ziji* also seems to show logophoric (perspective-sensitive) properties (Liu 2020). This paper aims to make further contributions to the linguistic discussion of logophoricity and *ta-ziji* by using linguistic experiments with controlled minimal pairs. It is worth mentioning that examining the logophoric properties of *ta-ziji* also holds important crosslinguistic value, as it aligns with analogous efforts with complex reflexives in other languages such as *himself/herself* in English (e.g., Cantrall 1974; Zribi-Hertz 1989; Pollard & Sag 1992; Reinhart & Reuland 1993), *zichzelf* in Dutch (Kaiser & Runner 2008), *caki-casin* in Korean (e.g., Kim & Yoon 2009), and *son propre* and *lui-mème* in French (e.g., Charnavel 2020).

The main goal of this paper is to explore whether the logophoric role of the non-local (subject) antecedent impacts the interpretation of *ta-ziji*, based on the results from offline antecedent choice judgment and online self-paced reading experiments. Two logophoric roles are examined, *source* and *perceiver*, which we turn to shortly in Section 2.

To foreshadow our conclusion, we find that the non-local reading of *ta-ziji* is relatively difficult when the non-local subject is an empathized perceiver where empathy can be equated with

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perspective-taking. However, if the non-local subject is an empathized source, LD binding of *ta-ziji* is allowed and even preferred. Thus, our results, coupled with previous comparative experimental research on *ziji* and *ta-ziji* (e.g., Lyu & Kaiser 2023), suggest that the exempt (i.e., non-local) use of *ta-ziji* is more restricted compared to the exempt use of *ziji*. Non-local *ta-ziji* is only licensed by (empathized) sources, whereas non-local *ziji* can be licensed by (empathized) non-sources as well (also see Huang & Liu 2001 inter alia for this point about *ziji*).

This paper is organized as follows. In Section 2, we introduce the notion of logophoricity and its relation to reflexives in Chinese, with a focus on the comparison of *ziji* and *ta-ziji*. Section 3 is an overview of prior theoretical and experimental work on *ta-ziji*. Sections 4 and 5 report an antecedent choice experiment and a self-paced reading experiment. We discuss the implications of the findings for linguistic theories in Section 6. Section 7 concludes the paper.

2. Logophoricity and reflexives. Logophoricity refers to the phenomenon where certain pronouns are coreferential with the author of the indirect discourse whose perspective the indirect discourse expresses (e.g., Hagège 1974; Clements 1975). These types of *perspective-sensitive* pronouns are called *logophors*. A widely cited example comes from Ewe which has the logophoric pronoun *yè*. In example (1), *yè* can only refer to the source of information *Kofi*.[1]

(1) Kofi be yè-dzo.
Kofi say LOG-leave
'Kofi$_1$ said that he$_{1/*2}$ left.'

Interestingly, some reflexives in human languages seem to be perspective-sensitive as well (see Charnavel 2021 for an overview). Due to the correlation between the notions of perspective and logophoricity, reflexives referring to perspective centers are often called *logophoric reflexives*. In Chinese, the uncontroversial logophoric reflexive is *ziji* (e.g., Huang & Liu 2001; Pan 2001, Wang & Pan 2015a, 2015b; Charnavel et al. 2017). *Ziji* can be bound locally or non-locally. When it is used non-locally, the speaker of the sentence needs to *empathize with* or take the perspective of the non-local subject (e.g., Huang & Liu 2001; Pan 2001). Empathy is defined as the "speaker's identification with a person/thing that participates in an event or state" (Kuno 1987: 206) and is a key concept in Sells' (1987) division of logophoric roles (i.e., perspective centers) that license the non-local use of reflexives. According to Sells (1987), the antecedents of logophoric reflexives (or perspective centers) come in three classes: source, self, and pivot (see (2)).

(2) a. Source: one who is the intentional agent of communication.
b. Self: one whose mental state or attitude the content of the proposition describes.
c. Pivot: one with respect to whose (space-time) location the content of the proposition is evaluated.

In this hierarchy, the source is the most prominent logophoric role and makes LD binding of *ziji* easily accessible, while the pivot is the least prominent role and LD binding by a pivot is less accessible (although allowed). Sells' logophoric hierarchy has been discussed extensively in the literature on the Chinese reflexive *ziji* (e.g., Huang & Liu 2001; Wang & Pan 2012).

However, in addition to these three roles in (2), the role of perceiver – which this paper focuses on – has also been investigated in the theoretical and experimental literature in relation to logophoricity (e.g., Reinhart & Reuland 1993; Culy 1994; Kaiser & Runner 2008; Kaiser et al.

[1] It may be worth mentioning that it is not only *yè* that can refer to attitude holders. Plain pronouns can also refer to attitude holders in Ewe (Pearson 2015: 97).

2009; Ameka 2017; Kaiser 2022). As summarized by Culy (1994: 1065), shown in (3), the source role is higher on the logophoric hierarchy than a perceiver.

(3) speech > thought > knowledge > perception

Despite different foci, Sells' logophoric hierarchy for logophoric reflexives and Culy's hierarchy for logophoric pronouns overlap regarding the prominent role of the source relative to other logophoric roles. In fact, the logophoric roles of source and perceiver have been experimentally examined in studies on (complex) logophoric reflexives in Dutch and English (e.g., Kaiser & Runner 2008; Kaiser et al. 2009; Sloggett 2017). These studies suggest that sources are more likely to license the exempt use of reflexives than perceivers are. The current study extends the comparison of source vs. perceiver to the study of the Chinese reflexive *ta-ziji*.

As mentioned in Section 1, it is often assumed that *ta-ziji* is strictly a syntactic reflexive, meaning that it is not perspective-sensitive. On the surface, this seems to be the case, as shown by Pan (1998: 792), reproduced in (4):

(4) Zhangsan$_i$ shuo Lisi$_j$ bu renshi ta-ziji$_{*i/j}$.
Zhangsan say Lisi not know he-self
'Zhangsan$_i$ said that Lisi$_j$ did not know himself$_{*i/j}$.'

However, the degradedness of (4a) is conceivably related to, among other possible factors, (i) the tendency for speakers to take their own instead of *Lisi*'s perspective by default (Kuno 1987), which may bias against *Lisi* as a perspective center and (ii) the fact that LD binding of *ta-ziji* across a human NP is highly infrequent and argued to be not allowed by Pan (1998).[2] The first factor mentioned above is especially relevant because without contextual cues, comprehenders are likely to treat reflexives as syntactic anaphors by default, as has been widely attested even by studies on *ziji* (e.g., Gao et al. 2005; Jäger et al. 2015; Dillon et al. 2016; Lyu et al. 2022). In this paper, we ask what happens if we make the non-local subject a perspective center: will Chinese speakers consider LD binding of *ta-ziji*? Furthermore, what happens when that perspective center is additionally a source?

Following our prior practice in Lyu and Kaiser (2021, 2023), we tested contexts where we elevate the non-local subject to the status of discourse topic. According to the Topic Empathy Hierarchy, "it is easier for the speaker to empathize with a person that he has been talking about than with an object that he has just introduced into the discourse for the first time" (Kuno & Kauraki 1977: 654). Thus, if a non-local subject is a discourse topic, it is also expected to be a perspective center. See (5) for an example:

(5) Xiaoming shi banji-li de youxiu xuesheng. Ke-shang, ta tingshuo Wang jiaoshou
Xiaoming be class-in DE excellent student lecture-on he hear Prof. Wang
zhaodao-le *ta-ziji* de xueshu lunwen.
find-ASP he-self DE academic paper
'Xiaoming is a good student in the class. During the lecture, he heard that Prof. Wang had found his academic paper.'

[2] The emphatic/contrastive *ta-ziji*, which can be LD-bound when the local antecedent is [+human], is not within the scope of this study (e.g., Pan 1998). In our examination of the written texts from an online corpus (www.cncorpus.org) with 140 tokens of *ta-ziji* in genitive position (the focus of our study), we found very few non-local uses of non-emphatic *ta-ziji*. Indeed, some of these non-local uses involve an inanimate local DP (e.g., 'music', 'warmth'), which fits Pan's generalization (see Section 3). However, there are a few tokens of (non-emphatic) cross-sentential uses of *ta-ziji*, which could be related to empathy but will not be discussed here.

In (5), *Xiaoming* in the first context sentence is a discourse topic which the second sentence (referred to as the "critical sentence" in our study) revolves around. The pronoun *ta* ('he'), which is coreferential with the discourse topic *Xiaoming*, is the potential non-local antecedent. Thus, the Topic Empathy Hierarchy predicts that people should be more likely to empathize with the perspective center *Xiaoming* than *Prof. Wang* (also see e.g., Oshima 2006; Lyu & Kaiser 2021, 2023 on the effectiveness of discourse topicality in inducing empathy with a non-local subject).

Note that in (5), the empathized non-local referent *ta* (i.e., 'Xiaoming') is a perceiver and is at the lowest end of Culy's (1994) logophoric hierarchy. Thus, if *ta-ziji* shows logophoric properties, as suggested by Liu (2020), we expect an increase in non-local binding probability when the empathized non-local subject is high on the logophoric hierarchy, compared to when it is low on the hierarchy. We build on prior work on logophoric reflexives (e.g., Kaiser & Runner 2008; Kaiser et al. 2009; Kaiser 2022) and contrast the role of perceiver with the role of source. We have two open questions regarding *ta-ziji*.

First, when the non-local referent is a discourse topic and a *perceiver*, do Chinese speakers accept LD binding of *ta-ziji*? Secondly, if the non-local referent is a *source*, for example when the embedded verb is 'tell (others)', does this increase the probability of LD binding? Before addressing these questions, we first review prior work relevant to this study in Section 3. Our goal in Section 3 is to provide a background for the present study and to highlight its potential contribution to the research on *ta-ziji*.

3. Overview of previous studies on *ta-ziji*. In this paper, we restrict our focus to non-emphatic/contrastive *ta-ziji*. It has been noticed since Pan (1998) that LD binding of *ta-ziji* is allowed when the local referent is inanimate, as in 'Zhangsan$_i$ said that the book hurt *ta-ziji*$_i$.' To explain this, Pan (1998) proposed that *ta-ziji* is constrained by semantic animacy in addition to syntactic locality. However, he assumes that LD binding of *ta-ziji* is impossible when the local referent is animate – referred to as the "blocking effect" in Pan (1998: 781). Although not explicitly stated, Pan and other linguists seem to implicitly subscribe to the view that *ta-ziji* is not perspective-sensitive, in contrast to *ziji* (e.g., Pan 1997, 2001; Cole et al. 2001).

However, in a truth-value judgment study where participants answered "acceptable" or "unacceptable" to the sentences that they read, Liu (2020) found that *ziji* and *ta-ziji* are sensitive to the logophoric role of the antecedent. An example is reproduced in (6). In (6a), the non-local referent *Lisi* is a source; in (6b), *Lisi* is a (non-source) topic. It was found that Chinese speakers strongly accept (6a) compared to the relatively low acceptance of (b). This was taken as evidence that the logophoric status of the non-local antecedent impacts both *ziji* and *ta-ziji*.

(6) a. Ju Lisi shuo, zhe-jian shi shanghai-le ziji/ta-ziji.
According to Lisi say this-CL event hurt-ASP self/he-self
'According to Lisi, this event hurt him.'
b. Shuodao Lisi, zhe-jian shi shanghai-le ziji/ta-ziji.
Speaking of Lisi this-CL event hurt-ASP self/he-self
'Speaking of Lisi, this event hurt him.'

However, this result can have alternative explanations. For example, (6b) violates the subject orientation principle (e.g., Huang & Liu 2001), as *Lisi* in (6b) is an object. The low acceptability of (6b) can thus be accounted for without resorting to logophoricity. Due to space, we will not comment on all the experiments reported by Liu (2020) but will simply point out that there is preliminary evidence that *ta-ziji*, like *ziji*, may be perspective-sensitive under certain conditions. In this paper, we aim to shed additional light on the discourse factors that render *ta-ziji* perspec-

tive-sensitive. Another interesting finding from Liu is that *ziji* is more likely to allow exempt readings than *ta-ziji*. This was investigated further in our earlier study (Lyu & Kaiser 2023) which we turn to next.

In our self-paced reading experiments in Lyu and Kaiser (2023), we used sentences like (7) to test Chinese speakers' binding preferences after seeing the reflexive *ziji/ta-ziji*. Note that, as with (5), the non-local subject in (7) is a discourse topic that one can empathize with. Furthermore, the matrix subject is mostly a perceiver, indicated by the verb *tingshuo* ('hear').

(7) Xiaoming shi banji-li de youxiu xuesheng. Ke-shang, ta tingshuo Wang jiaoshou
Xiaoming be class-in DE excellent student lecture-on he hear Prof. Wang
fabiao/pigai-le (*ta*-)*ziji* de xueshu lunwen.
publish/grade-ASP (he-)self DE academic paper
'Xiaoming is a good student in the class. During the lecture, he heard that Prof. Wang had **published/graded** his academic paper.'

To diagnose participants' interpretations during incremental reading, we used the verb directedness test (see e.g., Haiman 1983 on verb directedness): if local binding is preferred, other-directed verbs – semantically congruent with the non-local subject (e.g. *grade* in (7)) – should lead to reading slowdowns at/after the onset of the reflexive; if LD binding is preferred, self-directed verbs – semantically congruent with the local subject (e.g. *publish* in (7)) – should lead to slower processing. In that study, we found that, with *ziji*, Chinese speakers prefer LD binding, probably because the non-local topical subject is a perspective center. But with *ta-ziji*, there is no clear binding preference, which suggests that the exempt use of *ta-ziji* seems more difficult (see Lyu & Kaiser 2023 for more discussion).

The present study builds on and goes beyond our earlier work in Lyu and Kaiser (2023). We use the same method and diagnostic 'tool' to detect Chinese speakers' binding preferences during incremental comprehension, but now with *ta-ziji*. We also control the logophoric role of the (non-local) discourse topic subject.[3] Specifically, we compare the roles of source and perceiver and explore whether *ta-ziji* is logophoricity-sensitive.

Two experiments are reported. Experiment 1 is an offline antecedent choice judgment experiment. The goal of this offline experiment is two-fold: (i) testing the effectiveness of the verb directedness manipulation which has direct consequences for the verb directedness diagnostic used in the self-paced reading experiment; (ii) examining whether source and perceiver logophoric roles influence Chinese speakers' judgment at all after the whole sentence has been finished. Experiment 2 uses the verb directedness diagnostic to examine Chinese speakers' *binding preferences* after the onset of the reflexive, which Experiment 1 cannot do.

4. Experiment 1: Antecedent choice judgment. Experiment 1 tests the effectiveness of biased (self-directed vs. other-directed) verbs in eliciting (non-)local antecedent choices. It also probes whether the (empathized) source and (empathized) perceiver roles impact people's antecedent choices in spite of the biased verbs. However, it does not probe people's binding preferences the moment the reflexive is encountered.

[3] In Lyu and Kaiser's (2023) study, which did not focus on the source/perceiver distinction, 55% of the non-local subjects were perceivers, 10% were believers, and 35% were sources. This mixed profile of the non-local subjects does not impact the conclusions in that paper, but distinguishing the logophoric role of the non-local subject is crucial for the purposes of the present study.

4.1. PARTICIPANTS. Forty-four native Chinese speakers in mainland China participated remotely on PCIbex (Zehr & Schwartz 2018).

4.2. MATERIALS AND DESIGN. Two variables are manipulated, *logophoric role* (source/perceiver) and *verb directedness* (self-/other-directed), in a 2 x 2 factorial design. See (8) below for an example set of the target sentences.

(8) Xiaoming shi banji-li de youxiu xuesheng. Ke-shang, ta {**gaosu bieren/tingshuo**}
Xiaoming be class-in DE excellent student lecture-on he tell others hear
Wang jiaoshou {**fabiao/pigai-le**} (*ta-*)*ziji* de xueshu lunwen.
Prof. Wang publish/grade-ASP (he-)self DE academic paper
'Xiaoming is a good student in the class. During the lecture, he {**told others/heard**} that Prof. Wang had {**published/graded**} his academic paper.'

The non-local subject is always a discourse topic which is expected to be a perspective center. In the perceiver conditions, the non-local subject is a perceiver of information, indicated by predicates such as 'hear'; in the source conditions, the non-local subject is a source of information, as shown by the predicate 'tell (others).'

We chose 'tell' instead of 'say' because (i) there exists prior linguistic and psycholinguistic work on effects of 'tell' in reflexive resolution in English, Japanese, German, and Dutch (e.g., Sells 1987; Reinhart & Reuland 1993; Kaiser & Runner 2008; Kaiser et al. 2009; Kaiser 2022), and (ii) 'tell' followed by a recipient (here, 'others') makes the communication action clearer compared to 'say.' This maximizes the chances of detecting potential logophoricity effects.

Twenty target items mixed with 20 filler sentences were distributed into 4 lists using Latin Square. Each participant read 20 target sentences (5 per condition). The target sentences were preceded by or followed by a filler sentence. In Experiment 1, after reading a sentence, participants answered a comprehension question that probes the interpretation of the reflexive (e.g., 'who wrote the academic paper?') on target trials and a question unrelated to reflexive resolution on filler trials. An accuracy rate of 75% on the filler trials was used as a cut-off point to remove participants deemed not fully attentive to the task.

4.3. RESULTS. All participants had an accuracy rate of at least 75%. Figure 1 displays the mean proportion of non-local coreference by condition in Experiment 1. A mixed effects logistic model was fitted using the *glmer* function implemented by the *lme4* package in R (R core team 2022) to analyze the impact of verb directedness and logophoric role on reflexive interpretation. Sum coding was applied to the two factors (source: 0.5, perceiver: –0.5; self-directed: 0.5, other-directed: –0.5).

The statistical analysis shows a main effect of *verb directedness* ($\beta = 2.89$, SE = 0.20, $t = 14.43$, $p < 0.001$), suggesting that Chinese speakers prefer local binding when the verb is self-directed and non-local binding when the verb is other-directed. There is no main effect of *logophoric role* ($p > 0.1$). Although the *verb directness* x *logophoric role* interaction is not significant ($p > 0.2$), planned comparisons show a source advantage in the self-directed verb conditions, where sources trigger significantly more LD binding than perceivers ($\beta = –0.58$, SE = 0.25, $t = –2.30$, $p = 0.02$), but not in the other-directed verb conditions ($p > 0.6$). The source advantage asymmetry in the self- vs. other-directed verb conditions is perhaps not surprising, as there is less room for increase in non-local binding when most of the choices are non-local in the other-directed verb conditions, as shown in Panel A of Figure 1.

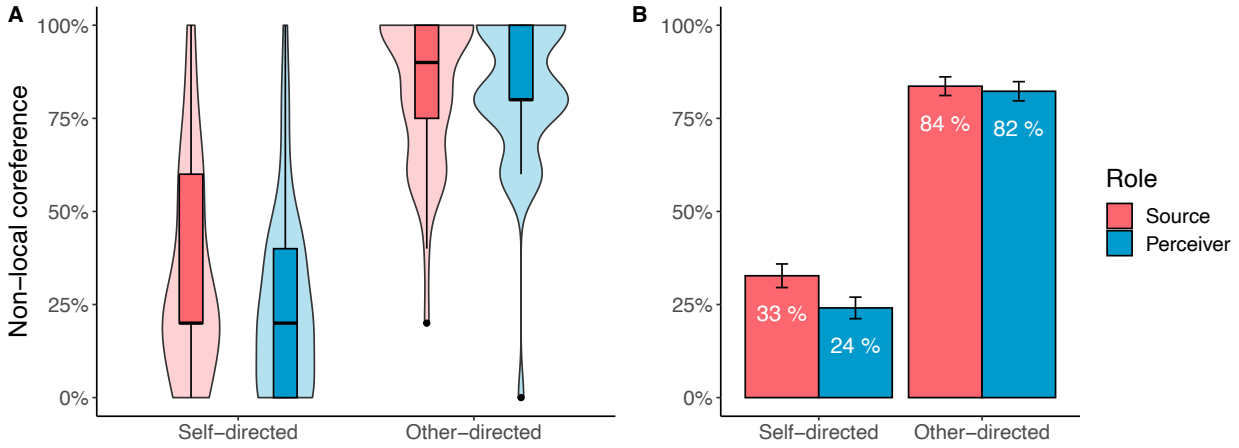

Figure 1. Proportions of non-local coreference in Experiment 1. In Panel A, the median is represented by the dark line inside each boxplot. The shape of the curve around the boxplot indicates the distribution of the data points. Panel B shows the mean proportions with error bars.

4.4. DISCUSSION. These antecedent choice results show that the interpretation of *ta-ziji* is strongly impacted by verb information, thus replicating Lyu and Kaiser (2023), and that the verb manipulation is successful in biasing (non-)local readings. Interestingly, it seems that when the non-local subject is empathized, the logophoric role impacts the interpretation of *ta-ziji* as well. However, this study does not provide real-time information about participants' binding preferences the moment they encounter the reflexive. Experiment 2 addresses this question.

5. Experiment 2: Self-paced reading. Experiment 2 relies on the verb directedness diagnostic to assess Chinese speakers' binding preferences at or after the onset of *ta-ziji*. As explained in Section 3, the local binding preference is diagnosed by reading slowdowns when the verb preceding the reflexive is other-directed (e.g., 'grade'); the non-local binding preference is indicated by reading slowdowns when the verb is self-directed (e.g., 'publish'). The goal of this experiment is to test Chinese speakers' binding preferences when the perspective center is a perceiver vs. a source.

5.1. PARTICIPANTS. Forty-seven native Chinese speakers in mainland China participated remotely on PCIbex. None of these participants had participated in Experiment 1.

5.2. MATERIALS AND DESIGN. Experiment 2 used the same experimental design and sentences as Experiment 1. However, for the comprehension questions on the target trials, 8 target items asked about the context sentence to ensure that participants also pay attention to context sentenc-es. The remaining 12 target trials probed antecedent choices, the results of which show similar choice patterns as Experiment 1 (not reported here due to space and the limited number of items per condition).[4] Participants with comprehension accuracy rates below 75% on fillers and on the 8 target questions about the context sentences were removed prior to data analysis.

5.3. RESULTS. Two participants were removed due to low comprehension question accuracies. The mean reading times (RTs) by condition and region for the remaining 45 participants are in Figure 2. The same coding scheme as in Experiment 1 was used. Mixed effects linear models were fitted for each region with the *lmer* function. Log-transformed RTs were entered into the

[4] Like Experiment 1, the end-of-sentence antecedent judgement results in Experiment show that the source advantage only exists in the self-directed verb conditions but not in the other-directed verb conditions.

models. In model comparisons, simpler models were adopted if there is no significant difference between the simple and a more complex model (Bates et al. 2015). The critical region is the reflexive.

At the first adverbial region (e.g., 'in lecture'), we find a main effect of *logophoric role* ($\beta = -0.05$, SE = 0.02, $t = -2.46$, $p = 0.01$). This is unexpected and probably spurious as all conditions are identical at this point. The pre-critical region, the biased verb (e.g., 'published/graded'), also reveals a main effect of *logophoric role* ($\beta = -0.06$, SE = 0.02, $t = -2.99$, $p < 0.005$): source conditions are read slower than pivot conditions. Note that this main effect is tied to the difference between the matrix predicates (i.e., 'told others' vs. 'heard') and could be related to the extra word 'others' in the source conditions, which makes the sentence longer and possibly referentially more complex. (A numerical trend of slower RTs in source conditions appears at the local subject already.) No other effects are significant before the critical region (ps > 0.05).

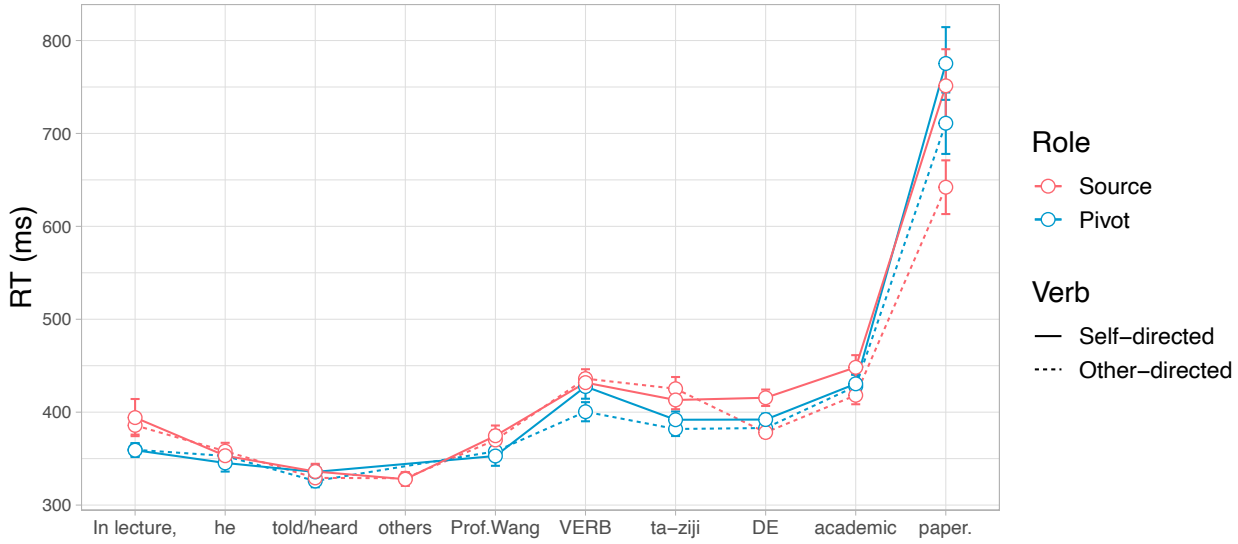

Figure 2. Mean reading times (RTs) by condition and region in Experiment 2.

At the critical region *ta-ziji*, the effect of *logophoric role* is again significant ($\beta = -0.06$, SE = 0.02, $t = -2.69$, $p < 0.01$), presumably a spillover of the pre-critical region tied to sentence length and referential complexity. There is no effect of *verb directedness* and no interaction (ps > 0.4).

At the first post-critical region (DE), we see a main effect of *verb directedness* ($\beta = -0.05$, SE = 0.015, $t = -3.20$, $p < 0.005$), no effect of *logophoric role* ($p > 0.3$), and, crucially, a *logophoric role* x *verb directedness* interaction ($\beta = -0.06$, SE = 0.03, $t = 2.08$, $p < 0.05$) which suggests that the binding preferences in the source and perceiver conditions are different. Planned comparisons indicate that, in the perceiver conditions, RTs in self-directed and other-directed verb conditions do not differ ($p > 0.3$), suggesting that there is no binding preference. This replicates our earlier study (Lyu & Kaiser 2023), where most matrix subjects are perceivers. In contrast, in source conditions, self-directed verbs elicit slower RTs than other-directed verbs ($\beta = -0.08$, SE = 0.02, $t = -3.75$, $p < 0.001$). According to the verb directedness diagnostic, this means Chinese speakers prefer non-local binding when the non-local subject is an (empathized) source.

The second post-critical region (e.g., 'academic') shows a main effect of *verb directedness* ($\beta = -0.04$, SE = 0.02, $t = -1.98$, $t < 0.05$): self-directed verbs overall lead to longer RTs. There is no main effect of *logophoric role* ($p > 0.7$) and no interaction ($p > 0.6$). The final region (e.g.,

'paper.') shows marginal main effects of *logophoric role* (β = 0.06, SE = 0.03, t = 1.83, p = 0.07) and *verb directedness* (β = –0.08, SE = 0.04, t = –2.05, p = 0.06), but no interaction (p > 0.5). Together, these two post-critical regions suggest that logophoricity impacts the incremental interpretation of *ta-ziji*.

However, closer inspection reveals that the verb directedness effect is driven more by the source conditions than the perceiver conditions, as shown in Figure 3. This is a subset of the data from Figure 2, focusing only on the 3 post-critical regions, replotted to make the pattern easier to see.

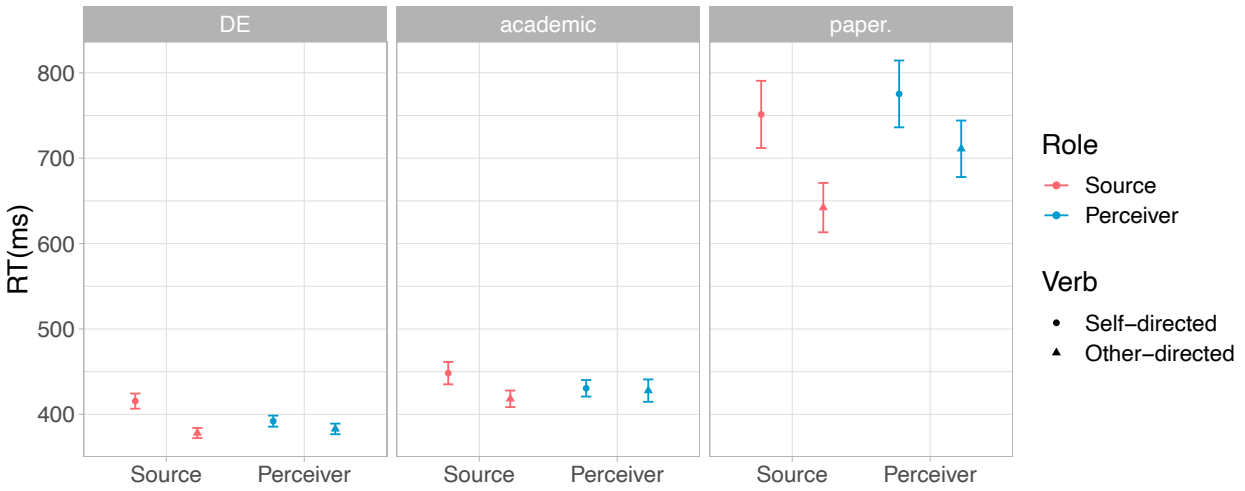

Figure 3. Mean reading times (RTs) for post-critical regions in Experiment 2.

Indeed, pairwise comparisons suggest that a *verb directedness* effect – longer RTs with self-directed verbs indicating LD binding preference – is found in source but not perceiver conditions (*DE*: see above; '*academic*' source conditions: β = –0.05, SE = 0.03, t = –1.80, p = 0.07; perceiver conditions: p > 0.3; '*paper.*' source conditions: β = –0.10, SE = 0.04, t = –2.34, p = 0.02; perceiver conditions: p > 0.2). But since only DE exhibits a significant *verb directedness* x *logophoric role* interaction (the two subsequent positions do not), future work is needed to clarify this pattern.

5.4. DISCUSSION. Experiment 2 probes Chinese speakers' binding preferences of *ta-ziji* during incremental processing. Using the verb directedness diagnostic, we find that participants showed a neutral binding preference when the matrix subject is a discourse topic and a perceiver. This replicates our earlier findings (Lyu & Kaiser 2023). But when the discourse topic is a source, we observed a non-local binding preference. Based on these findings, we propose that an empathized perceiver, low on the logophoric hierarchy, cannot easily license LD binding of *ta-ziji*. Only a role higher on the hierarchy such as a source role can license LD binding of ta-ziji.

Together with the findings of Experiment 1, this experiment shows that *ta-ziji* is sensitive to the logophoric hierarchy (Sells 1987; Huang & Liu 2001) and is in line with the conclusions of Liu (2020) in broad terms. However, unlike Liu (2020), this experiment reveals Chinese speakers' binding preferences for *ta-ziji* in the presence of (empathized) sources vs. perceivers and, importantly, shows a nuanced picture of the discourse-pragmatic properties of *ta-ziji*: unlike *ziji* which presumably can be non-locally bound by all logophoric roles, *ta-ziji* is selectively sensitive to certain roles – in this case, the source role. This is reminiscent of a previous study by Cole et al. (2001) (see Section 6 below) showing that the reflexive *kaki* ('self') in Teochew Chinese

can only have a non-local use when the non-local subject is a source, while non-local *ziji* in Singapore Mandarin is less selective for logophoric roles. For this study, we propose that this differential sensitivity to logophoricity applies to *ziji* and *ta-ziji* as well, even within the same dialect (i.e., Mainland Mandarin).

6. General discussion. The present study tests whether and how logophoricity influences Chinese speakers' interpretation of *ta-ziji,* conventionally thought to be a syntactic anaphor. We conducted an antecedent choice experiment and a self-paced reading experiment to shed light on the relation between logophoricity and LD binding of *ta-ziji*. Below, we first summarize the findings of this study. Next, we discuss the implications for linguistic theories of anaphora.

6.1. SUMMARY OF FINDINGS. In this study, which builds on prior theoretical (e.g. Kuno 1987; Oshima 2006) and experimental (e.g. Lyu & Kaiser 2021, 2023) work, the non-local subject is always a discourse topic which tends to be construed as a perspective center. We manipulate the logophoric role – source vs. perceiver – of the perspective center to examine the relation between logophoricity and *ta-ziji*.

The offline antecedent choice experiment (Experiment 1) provides novel evidence that empathized sources are more likely to lead to the non-local (exempt) use of *ta-ziji*, compared to empathized perceivers. Although different in experimental tasks and designs, the results align with the findings of Liu (2020) who found that LD binding by source antecedents (subjects) is more acceptable compared to LD binding by non-source antecedents (objects) (see Section 3). It is worth mentioning that, compared to Liu (2020), the non-local potential antecedent in our study is always a subject. Thus, the source advantage we have observed cannot be ascribed to subject orientation.

The online self-paced reading experiment (Experiment 2) makes further contribution to our understanding of the discourse-pragmatic properties of *ta-ziji* by testing Chinese speakers' interpretion preferences as they read sentences incrementally. Using the verb directedness diagnostic, we show that Chinese speakers do not have a clear preference for either the local or non-local reading of *ta-ziji* when the non-local subject is an empathized perceiver, which is in line with our previous findings (Lyu & Kaiser 2023). The lack of binding preference in the (empathized) perceiver conditions contrasts strikingly with the clear LD binding preference in the (empathized) source conditions. This incremental reading pattern thus suggests that (i) the logophoric status of the non-local discourse topic impacts the interpretation of *ta-ziji* and (ii) *ta-ziji* can be (and in fact tends to be) used as an exempt anaphor triggered by a topicalized/empathized source.

6.2. *TA-ZIJI* AS AN EXEMPT ANAPHOR. So far, we have obtained empirical evidence that *ta-ziji* can function as an exempt anaphor, provided that the non-local antecedent is a topicalized and presumably empathized source (given the aforementioned link between discourse topicality and empathy). This makes *ta-ziji* more similar to *ziji* that prior work might lead us to think. However, *ta-ziji* differs from *ziji* in one crucial aspect: perceivers can license the exempt use of *ziji* but not *ta-ziji*, at least at the population level, summarized below in Table 1.[5] This contrast suggests that

[5] We do not wish to make a categorical claim that empathized perceivers cannot license LD binding of *ta-ziji* at all for *all Chinese speakers*. Individual variation is conceivable among Mandarin Chinese speakers who also speak other varieties of Chinese languages/dialects. In fact, as we tentatively suggested in Lyu and Kaiser (2023), the lack of a clear binding preference with a topicalized subject may indicate that both local and non-local referents are equally probable as antecedents. Future research should look more into what other factors impact the presence vs. absence of a clear binding preference and whether individual variation plays any role.

it is simply harder, but not impossible, for *ta-ziji* to be used as an exempt anaphor compared to *ziji*.

	(Empathized) source	(Empathized) perceiver
Ziji	✓	✓
Ta-ziji	✓	??

Table 1. Non-local uses of *ziji* and *ta-ziji* with antecedents of different logophoric roles.

This interesting difference between *ziji* and *ta-ziji* echoes the study by Cole et al. (2001) who showed that *ziji* in Mandarin Chinese and *kaki* in Teochew Chinese (spoken in Singapore) show different sensitivities to the logophoric hierarchy à la Sells (i.e., source > self > pivot). In Teochew, only sources can license LD binding of *kaki*, as shown in (9a,b) (Cole et al. 2001: 5):

(9) a. Ah Leng$_i$ da Ah Meng$_j$ toi-dio kaki$_{i/j}$. (Source)
Ah Leng say Ah Meng see-ASP self
'Ah Leng$_i$ said that Ah Meng$_j$ saw her$_{i/j}$.

b. Ah Meng$_i$ m zai da Ah Leng$_j$ zeng toryam kaki$_{??i/j.}$ (Non-source)
Ah Meng not know that Ah Leng really hate self
'Ah Meng$_i$ does not know that Ah Leng$_j$ really hates herself$_{??i/j}$.'

In (9a), the non-local subject *Ah Leng* is a source, and LD binding is allowed. In (9b), the non-local subject *Ah Meng* is not a source of information, which makes LD binding unavailable or degraded. Cole et al. (2001) argue that this is related to the fact that *ziji* does not necessarily need to have a *de se* reading while *kaki* does. In other words, the non-local antecedent of *kaki* (e.g., *Ah Leng* in (9a)) must be aware of the event or action described in the embedded clause. For *ziji*, however, the awareness condition is not mandatory (also see e.g., Wang & Pan 2015a, 2015b).

Cole et al.'s (2001) observation about source vs. non-source is relevant to the present study, although their explanation along the lines of a *de se* reading seems inapplicable for the exempt use of *ta-ziji*: In our sentences, the perceiver is certainly aware of the event described in the embedded clause: if Xiaoming heard that Prof. Wang had graded his paper, he must be aware of this event by virtue of having received the information. However, the common link between Cole et al. (2001) and our study is that different reflexives – either in different Chinese dialects or within the same dialect – show similarities as well as differences in relation to logophoricity. In our case, it seems that both *ziji* and *ta-ziji* can be used as exempt reflexives bound by perspective centers, but the non-local use of *ta-ziji* is more selective compared to the non-local use of *ziji*.

We would also like to note that the non-local or exempt use of *ta-ziji* does not imply that, underlyingly, the dependency between *ta-ziji* and its non-local antecedent is established directly across the local domain. In fact, it has been proposed by Charnavel and colleagues (e.g., Charnavel & Sportiche 2016; Charnavel et al. 2017; Charnavel 2020) that the difference between the so-called 'local' and 'non-local' binding is only apparent. Under this view, seemingly non-local binding actually occurs locally inside the LogP which has an Op$_{log}$ as its head and a null pro$_{log}$ as its (subject) specifier. As shown below in (10) (adapted from Charnavel 2020: 706), the exempt anaphor is bound locally by the null *pro* (i.e., pro$_{log}$) in the LogP.

(10) DP$_i$ … [$_{TP}$ [$_{LogP}$ [pro$_{log\text{-}i}$ [Op$_{log\text{-}i}$ … exempt anaphor$_i$…]]]]

According to Charnavel and colleagues, the null pro$_{log}$ binding the exempt anaphor is co-indexed with a perspective center, represented here by a non-local DP. By extension, the exempt anaphor

is also coindexed with a perspective center. The difference between 'local' and 'non-local' binding, in their view, is that the former involves an overt binder while the latter involves a covert binder (i.e., pro_{log}). We think that this formal analysis could extend to the analysis of the 'non-local' use of *ta-ziji*, although the contribution of our empirically driven study does not hinge on any specific aspect of this theoretical analysis.

6.3. AN ALTERNATIVE EXPLANATION. In this study, we link logophoricity to perspective-taking or empathy, following prior theoretical work on perspective-sensitive reflexives (e.g., Sells 1987; Cole et al 2001; Huang & Liu 2001; Oshima 2006, 2007; Kim & Yoon 2009; Nishigauchi 2014; Charnavel et al. 2017; Charnavel 2020, 2021). However, the experimental results from the cur-rent study can have an alternative explanation without assuming this link.

In fact, using language data from Banda-linda, Ewe, and Donno Sɔ which have logophoric pronouns, Culy (1997) argues that logophoricity and perspective are not necessarily related, because multiple logophoric pronouns with different antecedents can occur in the same sentence. As there can only be one perspective center in a point-of-view domain (Banfield 1982), the antecedents of logophoric pronouns cannot all be perspective centers, which suggests that logophors do not necessarily express the perspectives of their attitude holders. This argument has been discussed by Wang and Pan (2015b) who argue that Chinese *ziji* is primarily empathic and not logophoric, as *ziji* can only have one perspective center. Now, suppose logophoricity is not tied to the notion of perspective, how do we explain the logophoricity effect in Experiment 1 and the binding preferences in Experiment 2? We offer an alternative explanation below.

First, let's consider the logophoricity effect in the offline antecedent choice task. According to Culy's (1994) logophoric hierarchy, crosslinguistically sources are more likely to be the antecedents of logophoric pronouns. If this typological hierarchy applies in a probabilistic manner in languages with logophoric reflexives such that sources are more often used as antecedents than perceivers, the results of Experiment 1 can be accounted for. If *ta-ziji* is sensitive to the logophoric hierarchy (assuming here that *ta-ziji* is not perspective-sensitive), the proportions of non-local uses of *ta-ziji* should be expectedly higher in the source conditions compared to the perceiver conditions.

Second, the different reading time patterns in Experiment 2 can also be explained without assuming perspective-sensitivity for *ta-ziji*. More specifically, discourse topicality, logophoric prominence, and syntactic locality can all be involved in anaphora resolution. For the absence of binding preference in the perceiver conditions, we can adopt a multiple-constraint approach to reflexive resolution assuming that *ta-ziji* is susceptible to discourse-level prominence. As the matrix subject is a discourse topic, it receives a boost in prominence. The local subject, although not prominent in the discourse, is syntactically more prominent by virtue of being a local antecedent. As a result, both local and non-local antecedents are similarly favored or considered as antecedents, hence the absence of binding preference. In the source conditions, however, the matrix subject is also logophorically prominent, which additionally favors the matrix subject as the antecedent. Since both discourse topic prominence and logophoric prominence favor the matrix subject against the local antecedent which is only syntactically more prominent, non-local binding is preferred, as shown in Experiment 2.

It is worth emphasizing that although we do not wish to make a strong claim linking perspective-sensitivity to the exempt use of *ta-ziji*, the findings of the current study fit the general predictions of a large body of theoretical literature linking perspective factors and the related notions (e.g., point of view, empathy, perspective) to the exempt use of (complex) reflexives.

Future work should make use of other theoretical and experimental tests to explore this question further. We regard this as a valuable direction for future investigation of the exempt use of *ta-ziji*.

7. Conclusion. The present study aims to examine whether *ta-ziji* can be used as an exempt reflexive outside the local domain and, if so, what factors impact its non-local use. Using an offline antecedent choice experiment and an online self-paced reading experiment, we discover that *ta-ziji* is sensitive to the logophoric role (i.e., source vs. perceiver) of the non-local antecedent. Revealingly, the self-paced reading experiment shows that when the non-local referent is an empathized source – but not an empathized perceiver – Chinese participants prefer LD binding of *ta-ziji*. This suggests that *ta-ziji* can be used as an exempt reflexive, just like *ziji*. However, unlike *ziji*, *ta-ziji* is only selectively sensitive to certain logophoric roles such as the source but not so much to the role of perceiver.

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