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Abstract. Relying on the classic *sloppy identity* diagnostic, prior research has observed that empty subjects in Mandarin Chinese cannot yield the sloppy identity reading, thus indicating that *argument ellipsis* (AE) is unavailable. Using a new diagnostic of AE proposed by Sakamoto (2015), this paper provides empirical evidence that in Mandarin, missing subjects anteceded by disjunctive arguments yield the so-called *disjunctive reading*, which can only be derived through AE. I then argue for a restricted environment where AE is available for missing subjects in Mandarin that not only explains the unavailability of sloppy reading but also captures the availability of disjunctive reading, i.e., when there is no operator-variable relationship between subject and topic positions.

Keywords. ellipsis; argument ellipsis analysis; *pro*; topic-variable analysis; disjunction

1. Introduction. Mandarin Chinese (henceforth Mandarin) has been characterized as a language that exhibits the ‘maximal freedom’ for the use of inaudible or invisible constituents (Huang 1984:533). See (1) from Huang (1984) as an example:¹

- (1) a. Speaker A: Zhangsan_i kanjian Xiaohong_j le ma?
 Zhangsan see Xiaohong PTCL MA
 Speaker A: ‘Did Zhangsan_i see Xiaohong_j?’
- b. Speaker B: e_i kanjian e_j le.
 see PTCL
 Speaker B: ‘[He_i] saw [her_j].’
- c. Speaker B: ta_i kanjian e_j le.
 3SG see PTCL
 Speaker B: ‘He_i saw [her_j].’
- d. Speaker B: e_i kanjian ta_j le.
 see 3SG PTCL
 Speaker B: ‘[He_i] saw her_j.’

In (1b), both the subject and object arguments are missing; however, they are both present in the interpretation of (1b), ‘He saw her’. The same reading can also be obtained from (1c) and (1d), where only the object or only the subject is omitted.

Prior research on empty arguments in East Asian languages has proposed the following hypotheses about what these missing arguments are and how they are derived:

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¹ Abbreviations used in this paper are as follows: ACC-accusative, C-complementizer, CL-classifier, COMP-complementizer *de*, COP-copula, *e*-empty, DAT-dative, GEN-genitive, MA-sentence-final interrogative marker *ma*, NEG-negation, NOM-nominative, PAU-pause particle, PERF-perfective, PTCL-particle, SG-singular, TOP-topic.

- (2) a. *Pro* analysis: An empty argument is a null pronominal (*pro*).
 b. Topic-variable analysis: An empty argument is a variable bound by a null topic.
 c. AE analysis: An empty argument is derived from argument ellipsis (henceforward AE).

I provide some details on the topic-variable analysis and the AE analysis. According to the former approach, (1d) can be represented with (3):

- (3) [TOP e]_i, t_i kanjian ta_j le.
 see 3SG PTCL
 ‘[Zhangsan/He]_i, t_i saw her_j.’

As shown in (3), the null subject is expressed as a variable bound by an empty topic, whose content is understood from the previous discourse. Differing from the *pro* and topic-variable analyses, where empty categories are involved, the AE analysis assumes that nominal arguments can be directly elided under identity with an antecedent (Oku 1998; Kim 1999; Saito 2004, 2007; Takahashi 2008; *inter alia*).

For Mandarin, empty subjects have been approached with the *pro* analysis (Huang 1982; Aoun & Li 2008; Li 2014; Li & Wei 2014, 2023) and the topic-variable analysis (Huang 1982, 1984), whereas empty objects have received the topic-variable analysis (Huang 1982, 1984) and the AE analysis (Cheng 2011, 2013). The availability of AE hence exhibits a subject-object asymmetry (Takahashi 2008, 2014; Cheng 2013; Li 2014). Focusing on the derivation of missing subjects, this paper challenges the claim that AE is not permissible in the subject positions in Mandarin (Takahashi 2008, 2014; Cheng 2013) and argues that it can be applied to empty subjects in a certain environment.

This paper proceeds as follows. Section 2 introduces the AE analysis in detail and presents a classic diagnostic for it, namely the availability of *sloppy identity*. Mandarin empty subjects cannot yield the sloppy identity reading, thus indicating that they cannot be derived by AE. However, using a new diagnostic proposed by Sakamoto (2015) that involves disjunction, I show a contradiction to the previous observation. Section 3 introduces this new diagnostic for AE, and Section 4 applies it to Mandarin. Crucially, I demonstrate that using the so-called *disjunctive reading*, Sakamoto’s test suggests that Mandarin missing subjects can be derived by AE. Subsequently, in Section 5, I explain why empty subjects lack sloppy identity, a key property of AE, but allow the disjunctive reading, another key property of AE. Specifically, I draw on Sato’s (2019) analysis of AE, whereby AE can be blocked by operator-variable configurations (see also Saito 2017). Finally, Section 6 concludes.

2. Argument ellipsis and sloppy reading. The idea that empty arguments arise from the ellipsis of full-fledged structures was first proposed by Oku (1998) for Japanese, where traditionally, missing subjects and objects have been uniformly identified as empty pronouns. However, the *pro* analysis fails to account for the interpretive ambiguity of the omitted subject in (4) from Takahashi (2014):

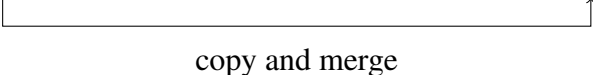
- (4) a. Taroo-wa [zibun-no kodomo-ga eigo-o hanasu to] omotteiru.
 Taroo-TOP self-GEN child-NOM English-ACC speak that think
 ‘Taroo thinks that self’s child speaks English.’
 b. Ken-wa [e furansugo-o hanasu to] omotteiru.
 Ken-TOP French-ACC speak that think
 ‘lit. Ken thinks that e speaks French.’

Anteceded by (4a), (4b) is ambiguous between the *strict* reading and *sloppy* reading. On the former interpretation, the null subject co-refers with the embedded subject in (4a), thus understood as Taroo’s child, while on the latter, it refers to Ken’s child. If the *pro* analysis were to be assumed (as illustrated in (5)), (4b) would be limited to the strict reading, whereby Ken thinks Taroo’s child speaks French.

- (5) Ken-wa [pro furansugo-o hanasu to] omotteiru.
 Ken-TOP French-ACC speak that think
 ‘Ken thinks that [Taroo’s child] speaks French.’

Since the *pro* analysis fails to yield the sloppy reading available to (4b), it cannot adequately account for the range of behaviors of empty arguments in Japanese.

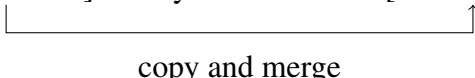
Alternatively, if arguments can directly undergo ellipsis, the interpretative ambiguity in (4b) can be accommodated. Specifically, Oku (1998) proposed that at LF, arguments can be copied from the discourse and covertly merged into the ellipsis site (see also Saito 2004, 2007; Takahashi 2008; Sato 2014, 2015; *inter alia*). Under his LF-copying approach to AE (cf. *PF-deletion* approach; see Section 3), (4) is represented as (6):

- (6) Taroo thinks that [self’s child] speaks English. Ken thinks that [self’s child] speaks French.


As indicated, the empty site of (4b) at LF is considered to contain the full-fledged noun phrase (NP), *zibun-no kodomo-ga* ‘self’s child’, and since the referent of the *self*-anaphor can be ‘Ken’, the availability of the sloppy reading is explained. Similarly, the sloppy interpretation can also be yielded in object positions in Japanese, as demonstrated by (7) from Otani & Whitman (1991):

- (7) a. John_i-wa [zibun-no tegami-o] sute-ta.
 John-NOM self-of letter-ACC discard-PERF
 ‘John_i threw out self_i’s letters.’
 b. Mary_j-mo e sute-ta.
 Mary-also discard-PERF
 ‘(Strict reading) Mary_j also threw out [self_i’s letters].’
 ‘(Sloppy reading) Mary_j also threw out [self_j’s letters].’

Again, the ambiguity can be accommodated by the AE analysis:

- (8) John threw out [self's letters] . Mary also threw out [self's letters] .
- 

 copy and merge

Turing to Mandarin, AE has been argued to be available only to objects but not to subjects (Takahashi 2008, 2014; Cheng 2013). Since the sloppy reading cannot be yielded in subject positions, a subject-object asymmetry appears to be borne out in (9) (adapted from Xu 2003) and (10) (adapted from Takahashi 2008):

(9) Object position:

- a. John_i shuo ta_i kanjian le ziji_i de mama,
 John say 3SG see PTCL self COMP mother
 ‘John_i said that he_i saw self_i’s mother.’
- b. Bill_j ye shuo ta_j kanjian le e.
 Bill also say 3SG see PTCL
 ‘(Strict reading) Bill_j also said that he_j saw [self_i’s mother].’
 ‘(Sloppy reading) Bill_j also said that he_j saw [self_j’s mother].’

(10) Subject position:

- a. Zhangsan_i shuo ziji_i de haizi mei na qian,
 Zhangsan say self COMP child NEG take money
 ‘Zhangsan_i said that self_i’s child did not take the money.’
- b. Lisi_j shuo e mei na jiu.
 Lisi say NEG take alcohol
 ‘(Strict reading) Lisi_j said that [self_i’s child] did not take the alcohol.’
 ‘(*Sloppy reading) *Lisi_j said that [self_j’s child] did not take the alcohol.’

Preceded by (9a), (9b) is ambiguous between a strict reading, where the empty object is interpreted as John’s mother, and a sloppy reading, where it is understood as Bill’s mother. By contrast, the omitted subject in (10b) may only have the strict reading that ‘Lisi said that Zhangsan’s child did not take the alcohol’. The absence of sloppy reading has been taken as an indication that Mandarin null subjects cannot be derived through AE (Takahashi 2008, 2014; Cheng 2013).

As illustrated by (11b) from Tomioka (2014), the reliability of sloppy readings as a diagnostic is undermined by the fact that they can be contextually introduced (see also Hoji 1998, Merchant 2010, and Frazier 2010):

- (11) a. John thinks his mother is beautiful, but Bill thinks she is rather plain.
 b. **Every man but Bill** thinks his mother is beautiful, but Bill thinks she is rather plain.

In (11a), the pronoun ‘she’ is understood as referring to John’s mother, and no sloppy reading is rendered. By adding the expression, ‘every x but y’, Tomioka (2014) argued that the sloppy read-

ing, where ‘she’ refers to Bill’s mother, is easier to obtain in (11b).² To address the unreliability of the sloppy reading diagnostic, Sakamoto (2015) proposed a new test for diagnosing AE that involves disjunction, to which I turn in the next section.

3. Disjunction as a new diagnostic for argument ellipsis. The diagnostic for AE proposed by Sakamoto (2015) hinges on the availability of *disjunctive reading* (henceforward DR) of a null argument that is anteceded by a disjunction. Using examples in Japanese, Sakamoto (2015) exemplified this reading by (12):

- (12) a. Taroo-wa Kanako ka Ayaka-o sonkeisiteiru.
 Taroo-TOP Kanako or Ayaka-ACC respects
 ‘Taroo respects either Kanako or Ayaka.’
 b. Hanako-mo e sonkeisiteiru.
 Hanako-also respects
 ‘lit. Hanako also respects e.’

The null object in (12b) is interpreted as the disjunctive antecedent as a whole, i.e., *Kanako ka Ayaka-o* ‘either Kanako or Ayaka’ (i.e., DR). Importantly, while the speaker does not know exactly who Taroo respects and exactly who Hanako respects, the individual respected by Taroo does not have to be the same as the one respected by Hanako. (12) thus holds true in a scenario where Taroo respects Kanako, and Hanako respects Ayaka. The interpretation of (12), as pointed out by Sakamoto (2015), patterns with that of (13) in English, where ellipsis is involved:

- (13) (DR) John respects either Mary or Nancy, and Bill does e, too.

The second conjunct of (13) is understood as ‘Bill respects either Mary or Nancy’, yielding the DR.

Crucially, Sakamoto (2015) showcased that DR is a reliable indication for AE by demonstrating that this reading is unobtainable from overt pronominal elements that are anaphoric on disjunctive arguments. In contrast to (12) and (13), an overt pronoun can only yield the *disjunctive E-type reading* (henceforth DER) (Simons 1996, 1998). For instance, consider ‘her’ in (14):

² The approximant of ‘every x but y’ in Mandarin fails to achieve the same effect for an empty argument in the subject position, as shown in (i) from Tomioka (2014):

- (i) a. mei-ge xuesheng chu-le Lisi dou renwei [ziji de laoshi hen congming].
 every-CL student except-PTCL Lisi all think self COMP teacher very smart
 ‘Every student except Lisi thinks that self’s teacher is very smart.’
 b. ??? dan Lisi renwei [e hen ben].
 but Lisi think very dumb
 ‘(?Sloppy reading) but Lisi thinks [Lisi’s teacher] is very dumb.’

According to Tomioka (2014), (i) is hardly acceptable: to elicit the pragmatically sensible meaning that ‘Lisi thinks that Lisi’s teacher is very dumb’, the expression, *ziji de laoshi* ‘self’s teacher’, needs to be repeated in the position occupied by ‘e’. The sloppy interpretation of an empty subject in Mandarin cannot be pragmatically forced in this context. Focusing on the derivation of empty subjects, I leave the question of why, unlike English, the sloppy reading of empty pronouns in Mandarin cannot be obtained via pragmatic means for future research.

(14) (DER) John respects either Mary or Nancy, and Bill respects her, too.

The referent of ‘her’ can only be understood as the one that John respects (i.e., DER). That is to say, while the speaker is unsure of the specific individual that John respects, they know that whoever John respects, Bill respects that person as well. Importantly, in Japanese, the same type of reading is also yielded when a null element is analyzed as a *pro*, supporting the hypothesis that the null argument in (12b) is derived via ellipsis. To demonstrate, Sakamoto (2015) tested the interpretation of a missing element anteceded by a disjunction in intra-sentential contexts. As independently observed by Abe (2009), in such contexts, only the *pro* analysis, but not the AE analysis, can be applied to derive an empty argument. This is evidenced by (15), where the omitted object argument can only be interpreted as John’s daughter, not the teacher’s daughter:

(15) John-wa zibun-no museme-ni [sensei-ga e aitagatteiru to] itta.
John-TOP self-GEN daughter-DAT teacher-NOM want.to.see C said
‘lit. John told self’s daughter that the teacher wanted to see e.’

Given the absence of the sloppy reading, the embedded null argument in an intra-sentential context is suggested to be a *pro* rather than derived by ellipsis (Abe 2009). As a result, this context provides a suitable environment to test whether an empty object (proven to be a *pro*) that is anteceded by a disjunction receives the DR or the DER. Replacing the antecedent of the null object in (15) with a disjunctive argument, one has:

(16) John-wa Kanako ka Ayaka-ni [sensei-ga e aitagatteiru to] itta.
John-TOP Kanako or Ayaka-DAT teacher-NOM want.to.see C said
‘lit. John told Kanako or Ayaka that the teacher wanted to see e.’

According to Sakamoto (2015), (16) can only mean that John told Kanako or Ayaka that the teacher wanted to see the one to whom John delivered the message, but not that John told Kanako or Ayaka that the teacher wanted to see Kanako or Ayaka. This strongly suggests that *pro* only yields the DER; thus, the *pro* analysis cannot derive the null argument in (12b).

Alternatively, Sakamoto (2015) argued that the availability of the DR should be explained with the AE analysis. Assuming a PF-deletion theory of ellipsis (see e.g., Tancredi 1992; Chomsky 1995; Merchant 2001), whereby ellipsis is considered as zero pronunciation at PF, Sakamoto (2015) proposed the following representation of (12b):

(17) Hanako also respects [_{NP} ~~Kanako or Ayaka~~].

Under the PF-deletion analysis, the disjunctive argument, ‘Kanako or Ayaka’, is understood to be present syntactically and simply elided at PF. Since the elliptic site includes the disjunction, the reading in question is accommodated for. The availability of the DR as a new diagnostic has been applied to other languages wherein AE is claimed to be available, such as Korean (see Kim 1999; Takahashi 2008). Specifically, Lee (2016) examined the omission of disjunctive arguments using various types of disjuncts (e.g., proper names and locative phrases) and concluded that in Korean, the DR should be explained with AE.

4. Disjunction as a diagnostic for argument ellipsis in Mandarin. In this section, I use disjunction as a new tool to investigate the availability of AE in the subject positions in Mandarin. The result of my analysis is two-fold. Specifically, providing the empirical evidence that the missing subjects anteceded by disjunctive arguments yield the DR, I argue that this interpretation cannot be derived through either the *pro* analysis or the topic-variable analysis. This finding, in turn, supports a novel observation that AE is available in the subject positions in Mandarin, challenging prior research that argued for its unavailability (e.g., Takahashi 2008, 2014; Cheng 2013; Li 2014).

First, consider (18-19):³

- (18) a. zuotian, Zhangsan huozhe Lisi ma le Xiaohong.
yesterday Zhangsan or Lisi scold PTCL Xiaohong
'Yesterday, Zhangsan or Lisi scolded Xiaohong.'
- b. jintian, e ma le Xiaoli.
today scold PTCL Xiaoli
'lit. Today, e scolded Xiaoli.'
- (19) a. zai niujin, zhege nansheng huozhe nage nvsheng fabiao le yanjiang.
in Oxford this boy or that girl give PTCL speech
'In Oxford, this boy or that girl gave a speech.'
- b. zai jianqiao, e jihua le youxing.
in Cambridge plan PTCL demonstration
'lit. In Cambridge, e planned a demonstration.'

In both (18) and (19), the missing subjects yield the DR: (18b) is understood as 'Zhangsan or Lisi scolded Xiaoli', and (19) as 'In Cambridge, this boy or that girl planned a demonstration'. Importantly, (18) and (19) are true when the individual who scolded Xiaohong is different from the one who scolded Xiaoli and when the one who gave a speech is different from the one who planned a demonstration. This is evidenced by (20), which is used in a context, where making distinct choices between the disjuncts in the first and second clauses is necessitated:

- (20) Context: there are two doors labeled 'Door A' and 'Door B', and they require different keys to open. The narrator is given two different keys, but they do not know exactly which key corresponds to each door.
- a. zhe-ba yaoshi huozhe na-ba yaoshi keyi da-kai men A.
this-CL key or that-CL key can hit-open door A
'This key or that key can open Door A.'
- b. bingqie e neng da-kai men B.
and can hit-open door B
'(DR) lit. and e can open Door B.'

³ In Mandarin, disjunction in an affirmative sentence can be expressed by both constructions *yaome XP yaome YP* and *XP huozhe YP*, which are both often translated into English as 'either XP or YP'. Since the former construction does not conjoin nominal phrases, the latter is used in relevant examples. Especially in colloquial Mandarin, *huozhe* can be abbreviated as *huo*, and they share identical semantic and syntactic functions (Liu & Chen 2017). The reader interested in the properties of *yaome XP yaome YP* is referred to Chen (2016). Finally, Mandarin also has an interrogative disjunct, *haishi*, the discussion of which can be found in Huang (1982, 1991) and Huang et al. (2009).

Similar to that in (18-19), the omitted subject in (20) receives the DR: (20b) means that ‘this key or that key can open Door B’. Crucially, in this context, although the narrator does not know exactly which key opens Door A and which opens Door B, the key to Door B is understood to be distinct from the key to Door A. As illustrated by (18-20), missing arguments in subject positions yield the DR.⁴

As introduced earlier, missing subjects in Mandarin have been traditionally treated as a *pro* or a variable bounded by an empty topic (Huang 1982, 1984; Aoun & Li 2008; Li 2014; Li & Wei 2014, 2023; *inter alia*). Both analyses, however, as will be shown, fail to obtain the DR. First, consider (21) which, minimally differing from (18), replaces the null subject with an overt pronoun, *ta* ‘he’:

- (21) a. zuotian, Zhangsan huozhe Lisi ma le Xiaohong.
 yesterday Zhangsan or Lisi scold PTCL Xiaohong
 ‘Yesterday, Zhangsan or Lisi scolded Xiaohong.’
 b. jintian, ta ma le Xiaoli.
 today 3SG scold PTCL Xiaoli
 ‘Today, he scolded Xiaoli.’

The overt pronoun in (21) yields the DER: the one who scolded Xiaoli is *the one* who scolded Xiaohong. Since (18) and (21) differ in their interpretations (DR versus DER), the empty subject in (18) cannot be considered as the null counterpart of an overt pronoun. Analogous to the missing arguments anteceded by disjunctions in Japanese and Korean (see Lee 2016), those in Mandarin cannot be accounted for with the *pro* analysis.

The applicability of the topic-variable analysis has not been examined in Japanese or Korean. Proposed by Huang (1984), this analysis suggests that an argument in Mandarin can be topicalized and deleted from the topic position, leaving an empty topic that bounds the variable. Crucially, the content of an empty topic is inferred from the discourse, typically ‘someone or something that a given discourse is about’ (Huang 1984:541). Take (1d) as an example. Since it is a response to the question, ‘Did Zhangsan see Xiaohong?’, the identity of the empty topic can be Zhangsan or a third-person pronoun, *ta* ‘he’, as indicated below:

⁴ The subject-object asymmetry regarding the availability of the sloppy reading is not observed in that of the DR. As demonstrated by (ii), an empty object also yields the DR:

- (ii) a. Zhangsan xihuan Lisi huozhe Wangwu.
 Zhangsan like Lisi or Wangwu
 ‘Zhangsan likes Lisi or Wangwu.’
 b. Maliu ye xihuan e.
 Maliu also like
 ‘lit. Maliu also likes e.’

Specifically, (ii-b) is comprehended as that the individual Maliu likes can be *either* Lisi or Wangwu, and this particular individual does not need to be the one liked by Zhangsan. The interested reader of the status or derivation of empty objects in Mandarin is referred to Huang (1982, 1984, 1991), Xu (2003), Li (2014), Liu (2014), and Pan (2019).

- (22) \downarrow
 $\left[\text{TOP } e \right]_i, t_i$ kanjian ta le.
 see 3SG PTCL
 ‘[e (=Zhangsan/He)]_i, t_i saw her.’

Huang (1984) argued that the occurrence of zero topics can be independently motivated by the key role that *topic-comment* structure (Chao 1968) plays in syntactically defining sentences in Mandarin, a *topic-prominent* (Li & Thompson 1976) and *discourse-oriented* (Tsao 1977) language. For an example of the topic-comment construction, see (23):

- (23) $[\text{TOP } na\text{-}ge \text{ nvsheng}]_i, [\text{COMMENT } Zhangsan \text{ kanjian } ta_i \text{ le}]$.
 that-CL girl Zhangsan see 3SG PTCL
 ‘That girl, Zhangsan saw her.’

The topicalized NP, *na-ge nvsheng* ‘that girl’, does not bear a selectional relation with the predicate, *kanjian* ‘see’. Rather, it stands in a relationship with the rest of the clause: the latter is ‘about’ the former. Huang (1984) contended that the prevalence of topic-comment constructions in Mandarin allows for the possibility of empty topics in sentences, such as (22).

However, the topic-variable analysis cannot be applied to all missing arguments, because the role of topics in Mandarin can only be fulfilled with definite or generic NPs (Chao 1968; Tsao 1977; Li & Thompson 1981; Chu 1998; *inter alia*).⁵ For instance, since (24) below contains an indefinite NP in the topic position, it is unacceptable:⁶

- (24) $*[\text{TOP } yi\text{-}ge \text{ nvsheng}]_i, Zhangsan \text{ kanjian } ta_i \text{ le}$.
 one-CL girl Zhangsan see 3SG PTCL
 ‘*lit. One girl, Zhangsan saw her.’

Since topics in Mandarin are subject to the definiteness requirement, the topic-variable analysis cannot be used to derive the null arguments anteceded by disjunctions, as disjunctive constructions are indefinite. As observed by Rooth & Partee (1982:7), there is a ‘logical parallelism’ between indefinites and disjunctions: the latter is ‘tantamount to existential quantification over an explicitly given finite domain’. For example, the disjunction, ‘either John or Bill’, can be considered to have a domain of quantification consisting of two elements, namely John and Bill. Additionally, in their scope-taking abilities, disjunctions, similar to indefinites, are scopally flexible. For instance, the disjunctive object in (25) below can have a wide scope reading, which is equivalent to ‘In the exam, Zhangsan is required to speak French or is required to speak English’ (but the narrator is not sure which one it is):

- (25) zai kaoshi li, Zhangsan xuyao shuo fayu huozhe yingyu.
 at exam in Zhangsan require speak French or English
 ‘In the exam, Zhangsan is required to speak French or English.’

⁵ Apart from the definiteness requirement, topicalization in Mandarin is also subject to island constraints. For a detailed discussion, see Huang (1982) and Huang & Yang (2013, 2024); see also examples (48) and (49) in Section 5.

⁶ Definiteness in Mandarin can be coded by using proper nouns, demonstratives, or pronominals (including possessives) (Liao 2010).

Furthermore, like indefinites, the scope of a disjunction is not trapped by scope islands. For instance, (26) is applicable to a situation in which the narrator is named as a beneficiary in exactly one person's will, but remains unaware of whether that individual is Zhangsan or Lisi:

- (26) ruguo Zhangsan huozhe Lisi qushi le, wo hui jicheng yi-dong fangzi.
 if Zhangsan or Lisi die PTCL 1SG will inherit one-CL house
 'If Zhangsan or Lisi dies, I will inherit a house.'

That (25) and (26) can receive the readings in question is evidenced by the fact that both examples are compatible with the continuation in (27), '... but I do not know which one it needs to be':

- (27) Continuation of (25) and (26):
 ... dan wo bu zhidao dei shi na yi-ge.
 but 1SG NEG know need COP which one-CL
 '... but I do not know which one it needs to be.'

As argued, disjunctions in Mandarin share several common properties in their meaning and scopal abilities as indefinites.⁷ As a result, disjunctions cannot serve as topics.

This prediction appears to be borne out, as disjunctive arguments are incompatible with the so-called *pause particles* in Mandarin, namely *a*, *ne*, *me*, and *ba*. As has been independently observed, a pause particle is able to separate a topical element from the rest of the clause, thereby signaling the topical status of a sentence-initial NP (Tsao 1977; Chu 1998; Paul & Whitman 2017; *inter alia*).⁸ For instance, the topic NP in (23) can be followed by *a*:

- (28) [_{TOP} na-ge nvsheng a]_i, [_{COMMENT} Zhangsan kanjian ta_i le].
 that-CL girl PAU Zhangsan see 3SG PTCL
 'That girl, Zhangsan saw her.'

By comparison, the particle *a* is incompatible with an indefinite NP or a disjunctive argument, as evidenced by (29):

- (29) a. *yi-ge nvsheng a, Zhangsan kanjian ta le.
 one-CL girl PAU Zhangsan see 3SG PTCL
 b. *Zhangsan huozhe Lisi a, likai le Beijing.
 Zhangsan or Lisi PAU leave PTCL Beijing

The unacceptability of (29b) supports the prediction that disjunctions, like indefinites, cannot serve as topics. Consequently, the topic-variable analysis cannot be applied to derive the omitted arguments that are anaphoric on them. Take (18) as an example. To obtain the DR, the missing

⁷ The connection between indefinites and disjunctions has been cross-linguistically established. For English, see Rooth & Partee (1982), Schlenker (2006), and Charlow (2014, 2020); for Japanese, Sinhala, and Tiwa, see Uegaki (2018), Slade (2011, 2015), and Dawson (2020).

⁸ Whether a pause particle (or a *topic marker*, Li & Thompson 1981) instantiates the head of TopP or simply indicates a pause is under debate. An interested reader is referred to Gasde & Paul (1996) and Badan (2007).

cannot be properly checked off in an elliptical clause. This is because when a DP, which has interpretable φ -features, is copied at LF from the antecedent clause onto the missing argument site, it has already participated in an agreement relationship with the probe in the antecedent clause, thereby preventing it from participating in another one. As a result, the uninterpretable φ -features in the elliptical clause remain unchecked, and the derivation of AE crashes.⁹ Arguing that Mandarin is a subject (but not object) agreement language, Miyagawa (2010, 2013) and Takahashi (2014) explained the absence of AE in subject positions as being blocked by its agreement system.

On the other hand, the DP approach (Cheng 2013) relates the distribution of AE to the DP/NP parameter that differentiates languages in terms of whether a DP layer is projected (Bošković 2008). Specifically, a language with phonetically overt articles has such a layer, while a language that lacks overt articles does not, projecting only the NP structure. Cheng (2013) proposed that PF-deletion targets only the complement of a phase head, and what is defined as a phase in a language depends on whether it has a DP. In NP languages, VP is a phase, whereas, in DP languages, such as English, vP is a phase (Cheng 2013). Analysing Mandarin as an NP language, Cheng (2013) contended that the relevant phase is a VP. As subjects in Mandarin are located outside of the VPs, they fail to undergo AE; by contrast, the direct object of a verb, being the complement of a phase head V, can be elided in PF deletion.

The availability of DR for empty subjects seems to be mysterious under the agreement and DP approaches. According to the agreement approach, AE is blocked by the agreement system in the subject positions. Since Mandarin is a language without overt morphological agreement, it is difficult to test whether disjunctive phrases in the subject positions exceptionally do not trigger agreement. I leave this issue for future research and do not further entertain this idea here. According to the DP approach, subjects are not legitimate targets that can undergo PF-deletion in an NP language. Under this analysis, the DR is wrongly predicted to be unavailable in the subject positions. It is also unlikely that, alternatively, a disjunctive phrase in this language does include DPs.¹⁰ Rejecting the possibility of AE, the relevant work (Miyagawa 2010, 2013; Takahashi 2014; Cheng 2013) instead subscribes to a uniform *pro* account of null subjects. However, as showcased in Section 4, overt pronouns give rise to the DER, suggesting that the DR cannot be obtained through the *pro* analysis.

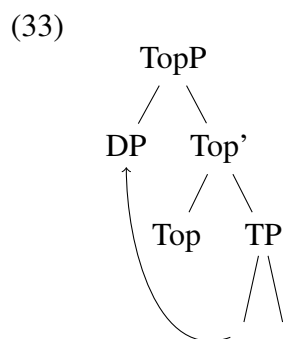
Differing from the previous approaches, the third one — the operator-variable approach — focuses on the relationship between the topic and the subject positions. Specifically, Sato (2019) argued that they form a so-called *operator-variable* relationship, which can block the application of the LF-copying theory of AE. The proposal that a subject is linked to the topic position by such a chain hinges on ‘the definite subject restriction’ in Mandarin (Sato 2019:653; see also Chao 1968, Li & Thompson 1976, 1981, Tsao 1977, and Shi 2000; *inter alia*), as demonstrated in (32):

⁹ Saito’s (2007) agreement approach is framed within the Probe-Goal framework from Chomsky (2000). This framework maintains that the operation of agreement is implemented by uninterpretable features carried by the probe and the goal.

¹⁰ The main purpose of evaluating prior theories of AE here is to consider whether they can help tease apart the availability of DR and the unavailability of sloppy reading in subject positions in Mandarin. Independently, the agreement and DP approaches are subject to other criticism. An interested reader is referred to Simpson et al. (2013) and Li (2014) that challenge the first approach by arguing that Mandarin does not have agreement and to Li (2007, 2018) for an argument that Mandarin is a DP, not NP, language.

- (32) *(you) yi-ge/ji-ge nongfu zai tianye shang xiuxi.
 exist one-CL/many-CL farmer at field top rest
 ‘*(There is/are) one/many farmers resting on the field.’

Without the existential marker, *you* ‘exist’, having the indefinites, *yi-ge/ji-ge nongfu* ‘one/many farmers’, occupying the subject position renders the example in question ungrammatical.¹¹ Recall that, similarly, topics in Mandarin are also subject to the definiteness requirement (see Section 4). In light of this, Sato (2019) argued that the definite subject restriction follows, if in the absence of overt topics, the subjects, by default, undergo string-vacuous movement from Spec-TP to Spec-TopP (see also Huang 1982, 1984, Jiang 2012, and Huang & Yang 2013), as demonstrated by the schematization below:



¹¹ One might recall that, in Section 4, I argued that disjunctive arguments are indefinite. Nevertheless, as illustrated by (18-20), sentences with disjunctive subjects are not grammatically marked. This is because, differing from topics, subjects in Mandarin can not only be definite but also specific (Li & Thompson 1981; Yang & Lin 2020). For instance, Li & Thompson (1981) pointed out that the indefinite NP, *yi-ge nongfu* ‘a farmer’, in (iii) from Li & Thompson (1975) is an acceptable subject when it refers to a farmer already known by the hearer, thereby receiving a specific reading (for further discussion, see Li & Thompson 1981 and Li & Wei 2023):

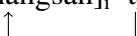
- (iii) yi-ge nongfu shuo: “wo xiang-chu yi-ge banfa le.”
 one-CL farmer say I think one-CL way PTCL
 ‘A peasant that: “I have thought of a way”.’

That disjunctive arguments can receive a specific reading is supported by the existential *you*-construction test (Partee 2006). Specifically, it is impossible for a specific NP to occur in the existential *you*-construction, and it is possible for it to occur as a sentential subject in a *you*-less sentence. As evidenced by (iv-v) below, a disjunctive argument is specific:

- (iv) Existential *you*-construction:
 a. *you Zhangsan huozhe Lisi zai huo-jiang ming-dan shang.
 exist Zhangsan or Lisi on receive-award list top
 b. *you yi-zhi/ji-zhi mao huozhe yi-zhi/ji-zhi gou zai waimian.
 exist one-CL/many-CL cat or one-CL/many-CL dog at outside
- (v) *you*-less sentence:
 a. Zhangsan huozhe Lisi zai huo-jiang ming-dan shang.
 Zhangsan or Lisi on receive-award list top
 ‘Zhangsan or Lisi is on the award list.’
 b. yi-zhi/ji-zhi mao huozhe yi-zhi/ji-zhi gou zai waimian.
 one-CL/many-CL cat or one-CL/many-CL dog at outside
 ‘One/Many cat(s) or one/many dog(s) is/are outside.’

Under this analysis, the underlying structure of a simple sentence, such as (34), is (35):

(34) Zhangsan kanjian le Xiaohong.
 Zhangsan see PTCL Xiaohong
 ‘Zhangsan saw Xiaohong.’

(35) [_{TopP} Zhangsan]_i t_i saw Xiaohong.


Sato (2019) contended that topicalization results in an operator-variable topic chain, which, as he argued, cannot be targeted by LF-copying as an input.¹²

The reasoning is as follows. First, following Saito (2017), Sato (2019) applied a chain-based interpretative mechanism to operator-variable structures. Take (10), repeated as (36), as an example:

- (36) a. Zhangsan_i shuo ziji_i de haizi mei na qian,
 Zhangsan say self COMP child NEG take money
 ‘Zhangsan_i said that self_i’s child did not take the money.’
 b. Lisi_j shuo e mei na jiu.
 Lisi say NEG take alcohol
 ‘(Strict reading) Lisi_j said that [self_i’s child] did not take the alcohol.’
 ‘(*Sloppy reading) *Lisi_j said that [self_j’s child] did not take the alcohol.’

The sentence in (36a) has two operator-variable topic chains, contained in the matrix and subordinate clauses respectively, as illustrated by (37) (with the positions where the operators and variables are interpreted at LF highlighted in bold):

(37) [_{TopP} **Zhangsan**_i [_{TP} t_i said that [_{TopP} [**self’s child**]_j [_{TP} t_j did not take money]]]]

As indicated, the variables are interpreted in their base positions, while the operators are interpreted in Spec-TopP. Since the antecedent of the null subject in (36b) is the embedded subject in (36a), the operator-variable configuration relevant to AE is *ziji de haizi* ‘self’s child’ and t_j, which, schematically, can be represented as follows (adapted from Sato 2019:656):

(38) [TOPIC x: x = self’s child] x did not take money

Now, depending on whether it is the operator or the variable portion of (38) is copied into the elliptical site in (36b), (39) or (40) can be derived:

(39) Copy the operator: [TOPIC x: x = self’s child] did not take alcohol

¹² More broadly, operator-variable chains can be formed through a number of operations that involve movement (Bošković 2008). For instance, see Sato (2019) for a discussion of how interrogative *wh*-phrases in Japanese can form an operator-variable configuration through *wh*-movement and thus cannot undergo AE.

(40) Copy the variable: x did not take alcohol

Neither the representation in (39) nor the one in (40) is interpretable at LF: the former contains an operator in an argument position, and the latter contains a free variable that is not properly bound by an operator. As a result, neither serves as a legitimate derivation for the ellipsis site in (36b) to be interpreted at LF. This is precisely because the antecedent of the missing subject is an operator-variable topic chain, blocking the LF-copying process. Furthermore, one might wonder whether the operator and the variable in (38) can be respectively copied onto the topic and subject positions of the elliptical clause in (36b), thus obtaining the following derivation:

(41) [TOPIC x: x = self's child] x did not take alcohol

Albeit legitimate, the configuration in (41) cannot be obtained: since it has been independently observed that AE can only target A-positions (Oku 1998), copying an element onto Spec-TopP, an \bar{A} -position, is impossible. Overall, it has been shown that the blocking effects exhibited by the operator-variable topic chains are two-fold. First, as only a portion of the chain can be copied onto the elliptical site, i.e., either the operator or the variable, the resulting derivations ((39) and (40)) are uninterpretable at LF. Second, the establishment of such a chain involves the topic position, which cannot be targeted by LF-copying, thus making the legitimate representation in (41) unobtainable. As a result of the blocking mechanism, LF-copying analysis of AE cannot be applied to (36), correctly predicting that the sloppy reading is not unavailable.

Importantly, the operator-variable approach also correctly captures the availability of DR for missing subjects in Mandarin. As will be argued, this follows from a key implication of this approach for the cross-linguistic distribution of subject AE: AE is predicted to be permissible in languages without operator-variable topic chains, which can be diagnosed by the absence of the definite subject constraint. Take Korean as an instance. Example (42) from Sato (2019) demonstrates that indefinite NPs can function as subjects in this language; as such, the sloppy interpretation can be yielded, as illustrated by (43) from Takahashi (2008):¹³

(42) Haksaeng-i wassda.
student-NOM came
'A student came.'

(43) a. Chelswu_i-nun caki-uy ai-ka Yengmi-lul ttaeliessta-ko sayngkakhakoissta.
Chelswu-TOP self-GEN child-NOM Yengmi-ACC hit-C think
'Chelswu_i thinks that her_i child hit Yengmi.'
b. Junho_j-nun e Mina-lul ttaeliessta-ko sayngkakhakoissta.
Junho-TOP Mina-ACC hit-C think
'(Sloppy reading) Junho_j thinks that [her_j child] hit Mina.'

¹³ Crucially, languages such as Korean do not rely on discourse factors to license the occurrence of indefinites in subject positions. In comparison, in Mandarin, the 'definiteness constraint on a subject can [only] be relaxed in a limited number of contexts' (Huang & Ting 2006:139). One such an example can be found in (iii) (see Footnote 11), where sufficient contextual information is assumed to treat the referent of an indefinite NP as a *specific* individual, thus allowing it to appear in the subject position.

In support, Sato (2019) also showed that in languages where the phenomenon of AE has previously been observed, such as Japanese and Mongolian (Takahashi 2008, 2014; Sakamoto 2016), the subjects also do not undergo topicalization.

Similarly, when null subjects and topic positions in Mandarin do not stand in an operator-variable chain relationship, AE should be permissible in principle. This prediction is borne out in the hanging topic constructions, such as (23), repeated as (44):

- (44) [TOP na-ge nvsheng]_i, [COMMENT Zhangsan kanjian ta_i le].
 that-CL girl Zhangsan see 3SG PTCL
 ‘That girl, Zhangsan saw her.’

To reiterate, the sentence-initial element in (44) is the topic, and the rest of the clause is the comment about the topic in question. Particularly, in this kind of construction, the topics are considered to be base-generated at Spec-TopP as opposed to being derived by movement (Pan & Hu 2008; see also Huang 1982 and Huang et al. 2009). Since there is no topicalization, the subjects do not enter into an operator-variable relationship with the topics. Consequently, the application of AE is not blocked. This is evidenced by (45) from Sato (2019), where the null subject in a hanging topic construction yields the sloppy reading:

- (45) a. [TOP Kayne_i], [COMMENT ta_i de wenzhang chuxian yu LI].
 Kayne 3SG COMP paper appear in LI
 ‘Kayne_i, his_i paper appeared in LI.’
 b. [TOP Rizzi_j], [COMMENT e_j chuxian yu NLLT].
 Rizzi appear in NLLT
 ‘(Sloppy reading) Rizzi_j, [his_j paper] appeared in NLLT.’

Anteceded by (45a), (45b) can be understood as ‘Rizzi’s paper appeared in NLLT’.

I propose that, analogously, the same analysis can be extended to the null subjects anteceded by disjunctive arguments. As argued in Section 4, disjunctions are indefinite; thus, given the obligatory definiteness requirement on the topic NPs, they cannot be topicalized (Li & Thompson 1976; Tsao 1977; Shyu 1995). As indicated by (30), repeated in (46), the topicalization of the disjunction in (18a) renders the sentence ungrammatical:

- (46) *_{[TOP e = (Zhangsan huozhe Lisi)]_i}, jintian t_i ma le Xiaoli.
 Zhangsan or Lisi today scold PTCL Xiaoli

Therefore, the disjunctive subject, as the subject in a hanging topic construction, does not form an operator-variable topic chain with the topic position. The application of AE is hence not blocked. This is borne out, as an omitted subject anaphoric on a disjunction can yield the DR, as demonstrated in (47) (= (18)) (see also (19-20)):

- (47) a. zuotian, Zhangsan huozhe Lisi ma le Xiaohong.
 yesterday Zhangsan or Lisi scold PTCL Xiaohong
 ‘Yesterday, Zhangsan or Lisi scolded Xiaohong.’
 b. jintian, e ma le Xiaoli.
 today scold PTCL Xiaoli
 ‘(DR) Today, [Zhangsan or Lisi] scolded Xiaoli.’

The operator-variable approach correctly predicts that in a restricted linguistic environment, i.e., where the subjects do not undergo topicalization, AE is allowed in the subject positions in Mandarin.

To conclude, reviewing the previous accounts of the asymmetrical distribution of AE in Mandarin, I showed that only the operator-variable approach can not only explain the unavailability of sloppy reading but also straightforwardly capture the availability of the DR in subject positions. Specifically, the former phenomenon is accounted for with the blocking effects of the operator-variable topic chains, and when subjects and topics are not connected by such a relationship, AE is permitted, thereby giving rise to the DR. This prediction is indeed confirmed in the constructions where operator-variable chains are not formed, such as relative and conditional clauses (Sato 2019). Since these structures involve islands, topicalization crossing the islands is banned. Given the absence of topicalization, AE is available, allowing the DR to be obtained, as illustrated by (48) and (49) (adapted from (26)):

(48) Relative clause:

- a. Zhangsan du le [NP [CP zhe-ge xuesheng huozhe na-ge xuesheng zhe-ge
 Zhangsan read PTCL this-CL student or that-CL student this-CL
 xingqi xie] de lunwen].
 week write COMP essay
 ‘Zhangsan read the paper that this student or that student wrote this week.’
 b. Lisi du le [NP [CP e shang-ge xingqi xie] de lunwen].
 Lisi read PTCL up-CL week write COMP essay
 ‘(DR) Lisi read the paper that [this student or that student] wrote last week.’

(49) Conditional clause:

- a. ruguo Zhangsan huozhe Lisi qushi le, wo hui jicheng yi-dong fangzi.
 if Zhangsan or Lisi die PTCL 1SG will inherit one-CL house
 ‘If Zhangsan or Lisi dies, I will inherit a house.’
 b. ruguo e mei qushi, wo hui jicheng yi-liang che.
 if NEG die 1SG will inherit one-CL car
 ‘(DR) If [Zhangsan or Lisi] does not die, I will inherit a car.’

As expected, both (48b) and (49b) receive the DR: the former is understood as ‘Lisi read the paper that this student or that student wrote last week’, and the latter as ‘If Zhangsan or Lisi does not die, I will inherit a car’. Similar to (26), (49b) is also compatible with the continuation that ‘... but I do not know which one it needs to be’. Also, as with the other examples where the DR is obtained, despite the speaker’s lack of knowledge about the exact situation in which they would

inherit a house or a car, (49) is applicable to a scenario where the person in the dying condition differs from the one in the not-dying condition. Finally, since disjunctions do not trigger topicalization, bound anaphors occurring in disjunctive phrases should also be able to receive the sloppy reading, as demonstrated by (50):

- (50) a. Zhangsan_i renwei ziji_i de yingyu laoshi huozhe ziji_i de yuwen laoshi
 Zhangsan think self COMP English teacher or self COMP Chinese teacher
 hen yange.
 very strict
 ‘Zhangsan_i thinks self_i’s English teacher or self_i’s Chinese teacher is strict.’
- b. Lisi_j renwei e hen kuansong.
 Lisi think very lenient
 ‘(DR + strict reading) Lisi_j thinks [self_i’s English teacher or self_i’s Chinese teacher] is lenient.’
 ‘(DR + sloppy reading) Lisi_j thinks [self_j’s English teacher or self_j’s Chinese teacher] is lenient.’

As indicated, the embedded empty subject in (50) receives the DR, understood as ‘self’s English teacher or self’s Chinese teacher’. Importantly, the *self*-anaphor in (50b) can have either the strict reference, co-referring with the subject of the antecedent clause, Zhangsan, or the sloppy reference, co-referring with the subject of the matrix clause, Lisi. Example (50b) hence is ambiguous between a reading where Lisi thinks Zhangsan’s English or Chinese teacher is lenient and a reading where Lisi thinks his own English or Chinese teacher is lenient. In contrast to (12), where the sloppy reading is absent in the subject position, (50) illustrates a linguistic environment in which it is available — when pronouns are contained in disjunctive phrases.

6. Conclusion. Overall, this paper investigated the availability of AE in subject positions in Mandarin. Using disjunction as a new diagnostic (Sakamoto 2015), I observed that, contrary to conventional wisdom (Takahashi 2008, 2014; Cheng 2013; Li 2014), missing subjects in Mandarin can be derived from AE. Providing empirical evidence that null subjects yield the DR, I argued that the reading in question cannot be obtained from the traditional *pro* analysis or topic-variable analysis; thus, AE has to be invoked. Finally, I showed that the puzzling availability of AE in subject positions can be explained by Sato’s (2019) operator-variable approach. Specifically, since disjunctive arguments are indefinite, they cannot be topicalized to enter an operator-variable chain relationship with topics. Consequently, AE is not blocked when the null subjects are anteceded by disjunctions, allowing the DR to be available.

My analysis supports the reliability of disjunction as a diagnostic for AE by employing it in Mandarin. More importantly, it also shows that this test can provide the grounds for excluding not only the *pro* analysis of missing subjects but also the topic-variable analysis. In particular, as mentioned in Section 4, whether the latter approach can accommodate the DR has not been examined elsewhere. Finally, this paper also demonstrates how Sato’s (2019) operator-variable approach can be extended to account for missing subjects anteceded by disjunctions, offering further evidence for the novel observation that AE is permissible in Mandarin subject positions.

Future studies can further examine focus constructions and focus movement to provide independent evidence that operator-variable chains preclude AE. If focus movement similarly creates

operator-variable dependencies, AE is predicted to be unavailable in such environments as well. Second, future research can examine the cross-linguistic variation in the relationship between AE and topicalization. In a recent paper on Japanese, Mizuno (2025) argued that AE is an instance of topic deletion, based on its parallelism with topicalization in its interaction with *wh*-phrases. This proposal carries two implications that run counter to my analysis developed here: (1) regarding the distribution of AE, Mizuno (2025) claimed that what cannot be topicalized cannot undergo AE, and (2) AE and discourse *pro*-drop — traditionally analyzed as topic deletion (Tsao 1977, Huang 1984; *inter alia*) — are unified phenomena in Japanese. By contrast, I have argued that AE is permitted precisely when the subject in the antecedent clause does not undergo topicalization; on this view, topicalization licenses *pro*-drop but blocks AE. One possible way to account for this puzzling contrast is to posit two types of AE: one involves movement and therefore subject to locality and intervention effects (Fujiwara 2020), and another involves base generation, which lacks movement-related constraints. Future cross-linguistic research can investigate which languages instantiate movement-type of AE and which exhibit base-generated AE, as well as the parameters underlying this variation. On this view, the alignment between AE and topicalization observed in some languages, such as Japanese, reflects the availability of movement-based AE. This perspective may contribute to a more nuanced understanding of the typological relationship between discourse *pro*-drop and AE (cf. Mizuno 2025), suggesting that their unification may be contingent on the specific derivational properties of AE in a given language.

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