

Pronouns, null arguments, and ellipsis in Mandarin Chinese¹

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Abstract. This paper argues that both overt and null pronouns in Mandarin are the elliptical counterparts of corresponding overt noun phrases. Specifically, null pronouns are the pronominal counterparts of bare nouns, which are typically restricted to unique definite environments, while overt pronouns are the pronominal counterparts of demonstrative descriptions, which are typically restricted to anaphoric definite environments. This result provides support for a hypothesis we call *Determiner-Pronoun Parallelism*: the idea that a language’s pronominal inventory is isomorphic to its determiners used for the expression of definiteness distinctions.

Keywords: pronouns, ellipsis, determiner, definiteness, anaphora, Mandarin.

1. Introduction

Mandarin is one of many languages where both subjects and objects can be null given the proper discourse context (Huang, 1984). In such contexts, they seem to serve as translational equivalents of overt pronouns:

- (1) a. (ta) lai-le.
(s/he) came-PERF
'S/he came.'
- b. Lisi hen xihuan (ta).
Lisi very like (him/her)
'Lisi likes him/her very much.'
- (Huang, 1984: p. 537)

Given the equivalence of overt pronouns and null arguments, one common approach has been to analyze null arguments as the deleted counterpart of overt pronouns (e.g. Neeleman and Szendrői, 2007).

We demonstrate in this paper that such a view is mistaken: overt and covert pronouns often occur in distinct semantic contexts and, therefore, null pronouns cannot simply be the deleted counterpart of the former. Restricting our focus to third person pronouns, we propose that null and overt pronouns are derived from semantically distinct DPs via ellipsis. Specifically, while null pronouns are the pronominal counterpart of unique definite determiners, the overt pronoun (*ta*) is interpreted as a variable ranging over indices; they are arguments of anaphoric definite determiners:

- (2) *Mandarin null pronoun via ellipsis*
- a. \emptyset_i xuesheng $\rightarrow \emptyset_i$
the_{unique} student
- b. $\llbracket(2a)\rrbracket = \iota x[\text{student}(x)]$

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- (3) *Mandarin overt pronoun via ellipsis*
- a. (ta) na ge xuesheng \rightarrow ta
s/he that_{anaphoric} CL student
- b. $\llbracket(3a)\rrbracket^g = \iota x[\text{student}(x) \wedge x = g(1)]$

The distinction in Mandarin directly reflects a distinction in Mandarin definites discussed in Jenks (2018). Similar semantic distinctions for weak versus strong pronouns have been made for German (Patel-Grosz and Grosz, 2017) and Tswefap (Clem, 2017). We conjecture that this parallelism is no coincidence: if pronouns are generally derived from overt noun phrases by ellipsis, then the pronominal system of a language will reflect its determiner system.

2. Definiteness distinctions and their pronominal counterparts

Schwarz (2009) demonstrates that a morphological distinction between weak and strong definite articles in German has a semantic basis: the weak definite article occurs in unique definite contexts, and the strong definite article occurs in familiar/anaphoric definite contexts. Patel-Grosz and Grosz (2017) propose that this distinction is mirrored in the structural distinction between pronouns in German. Specifically, weak definite articles and personal pronouns lack a semantic index and are structurally small, while strong definite articles and demonstrative pronouns project an index and are, hence, structurally large. Evidence for this distinction in pronouns comes from, for example, the fact that personal pronouns sometimes can be used without an explicit antecedent:

- (4) a. Wenn ich schwanger werde, werde ich {es / #das} auf jeden Fall behalten.
if I pregnant become will I it DEM on every case keep
'If I get pregnant, I will definitely keep it / #DEM(= the baby).'
- b. Wenn ich ein Kind kriege, werde ich {es / das} auf jeden Fall behalten.
if I a child get will I it DEM on every case keep
'If I have a child, I will definitely keep it / DEM(= the baby).'
- (Patel-Grosz & Grosz 2010:349)

(4a) is an appropriate context for a unique definite description (*the baby*) but not an anaphoric definite description, as there is no overt prior mention of a baby.

The syntax and semantics below captures this contrast (Patel-Grosz and Grosz, 2017: pg. 262):

	<i>Personal pronoun</i>	<i>Demonstrative pronoun</i>
Syntax	<pre> D_detP ├── D_det │ ├── the_weak │ └── s_r └── NP └── <baby> </pre>	<pre> D_deixP ├── D_deix │ └── 1 └── D_detP ├── D_det │ ├── the_strong │ └── s_r └── NP └── <baby> </pre>
Semantics	$\llbracket D_{\text{det}}P \rrbracket^g = \iota x[\text{baby}(x)(s_r)]$	$\llbracket D_{\text{deix}}P \rrbracket^g = \iota x[\text{baby}(x)(s_r) \wedge x = g(1)]$

Both kinds of definite articles take as their first argument a resource situation (s_r), which provides a contextual domain restriction (Elbourne, 2005). Demonstrative pronouns include an additional DeixP projection (cf. Cheng et al., 2017), and the index in the demonstrative pronoun must be bound by a discourse antecedent. The deleted NP is semantically recoverable.

Clem (2017) records a similar situation in Tswefap (Grassfields Bantu), claiming that only the strong pronoun/definite contains a semantic index. While the details of definiteness in Tswefap are not clear, it is significant that the strong pronoun can function as an article, and that bare nouns independently can receive definite interpretations in Tswefap, as in Mandarin.

The parallels between pronouns and definite noun phrases in German and Tswefap suggest the following conjecture:

- (6) *Determiner-pronoun parallelism*: Whatever distinction a language makes in its definiteness system will be mirrored in its pronominal system.

In addition to capturing the observed connections between definiteness and pronouns in German and Tswefap, *determiner-pronoun parallelism* is predicted by the D-type analysis of pronouns of Elbourne (2001, 2005), in which pronouns are analyzed as definite articles with deleted NPs. Applied to languages with a grammatical distinction between anaphoric and unique definites, Elbourne's theory straightforwardly predicts the definite expressions of a language might be reflected in its pronominal system, as simple NP ellipsis should permit the underlying semantics of a D head to survive.

Some additional evidence that (6) is on the right track comes from an unexpected place: languages like Mandarin without definite articles:

- (7) *Discourse pro-drop generalization*: Languages that allow discourse pro-drop — Japanese, Chinese, Korean — allow (robust) bare NP arguments.
(Tomioka, 2003, cf. Barbosa, To appear)

Tomioka (2003) argues that this generalization holds because null arguments always include null property anaphora (or ellipsis), exactly as we might expect under the D-type analysis of pronouns.

Now Jenks (2018) shows that despite lacking a definite article, Mandarin distinguishes unique and anaphoric definites, like German. In Mandarin, bare nouns are used in unique definite contexts, such as to refer to the moon in (8a), while demonstrative descriptions occur in anaphoric definite contexts, such as the donkey anaphor in (8b):

- (8) a. **yueliang** sheng shang lai le.
moon rise up come PERF
'The moon has risen.' (Chen, 2004: p. 1165)
- b. ni jiao shei jin-lai, wo dou jian **na ge ren**.
you ask who enter, I all see that CLF person.
'Whoever you ask to come in, I'll see that person.' (Jenks, 2018: p. 511)

Jenks proposes an analysis of this contrast analogous to the distinction between unique and anaphoric definites in German as above, where the latter contains an additional argument, an variable interpreted relative to some interpretation function g .

- (9) a. $\llbracket \text{yueliang} \rrbracket^g = \iota x[\text{moon}(x)(s_r)] = \text{'the unique moon in } s_r\text{'}$
 b. $\llbracket \text{na ge ren} \rrbracket^g = \iota x[\text{person}(x)(s_r) \wedge x = g(1)] = \text{'the unique person in } s_r \text{ identical to } g(1)\text{'}$

By *determiner-pronoun parallelism* (6), we predict that if null arguments/pronouns are the pronominal counterpart of bare nouns in Mandarin, as predicted by Tomioka, some pronominal category might be the counterpart of demonstratives. In the following section we show that overt pronouns serve this function in Mandarin, building on Bi (2018).

3. Null versus overt pronouns in Mandarin

This section provides evidence for the following generalization about null versus overt pronouns in Mandarin.

- (10) a. Null arguments ($= \emptyset$) have a parallel distribution to bare definite nouns, and, in turn, to unique definites;
 b. Overt pronouns ($= ta$) have a parallel distribution to complex demonstratives, and, in turn, to anaphoric definites.

After establishing the generalization in this section, in the following section we derive the parallel by proposing an ellipsis-based account of both kinds of pronouns.

One complication is that there are a number of differences in the status of null subjects and objects in Mandarin, surveyed by Li (2014). For examples, null objects can receive indefinite interpretations, but null subjects cannot. Additionally, embedded null subjects are subject-oriented anaphora, and must be bound by the closest c-commanding subject. Overt pronouns also differ in the two positions: overt embedded subject pronouns cannot be interpreted as bound variables, while this restriction does not obtain for overt object pronouns Huang (1991). This asymmetry is absent in many other null subject languages such as Japanese, and has motivated the proposal that the status of null subjects and null objects is fundamentally different in Mandarin (Saito, 2007; Miyagawa, 2010; Tomioka, 2014). However, contrary to the expectations of this work, we show that the generalization in (10) obtains in both subject and object positions, yet we steer clear of embedded subject positions, which appear to have a somewhat different status (for discussion, see Barbosa, To appear).

3.1. Contexts prohibiting overt pronouns

The following four contexts are incompatible with overt pronouns in Mandarin, and only allow null arguments:

- (11) Contexts requiring null pronouns in Mandarin
 a. Anaphora to indefinites under the scope of negation ('bathroom sentences')
 b. Situation-dependent covariation ('president sentences')
 c. Anaphora to implicit antecedents
 d. Anaphora to globally unique definites

Bare nouns, as unique definites, are required in the same contexts (Jenks, 2018, Appendix A).

We begin with so-called 'bathroom sentences' (attributed to Barbara Partee by Roberts (1989)), in which an indefinite antecedent is under the scope of negation. Because of its scopal proper-

ties, this indefinite does not introduce an individual to the discourse. Nevertheless, pronominal reference to the antecedent is possible in languages like English. In Mandarin, anaphora to indefinites under the scope of negation must be null; overt pronouns are prohibited (Bi, 2018). This restriction obtains for subjects (12) and objects (13).

- (12) zhe-dong lou yaome mei-you xishoujian_I, yaome $\emptyset_I/\#ta_I$ jiu zai qiguaide
 this-CLF building either not-have bathroom or (it) then in weird
 difang.
 place
 ‘Either this building does not have a bathroom, or it is in a funny place.’
- (13) tushuguan yaome mei-you zixishi_I, yaome jiu yijing youren yuding-le
 library either not-have study.room or then already someone reserve-PERF
 $\emptyset_I/\#ta_I$.
 (it)
 ‘Either the library does not have a study room, or someone has reserved it.’

These facts indicate that overt pronouns must refer to actual entities in the range of a contextual assignment function, but null pronouns are not subject to this restriction.²

The same contrast was noted for Japanese by Kurafuji (1998, 1999), who also concluded from these facts that the two types of pronouns have distinct interpretations. However, Elbourne (2005: pp. 40-45) takes issue with Kurafuji’s conclusion, pointing out that the relevant overt pronoun in Japanese is a demonstrative pronoun, which Elbourne argues may be ruled out for independent reasons in bathroom sentences. Elbourne’s argument does not carry over to Mandarin, however. This is because *ta* ‘s/he, it’ is a personal pronoun, distinct from the demonstrative pronoun *na-ge* (see Section 6). Bi’s replication of the Japanese facts in Mandarin resurrects the plausibility of Kurafuji’s original explanation: overt pronouns in Japanese, like Mandarin, cannot access indefinite antecedents under the scope of negation because they require an discourse antecedent.

The second context where overt pronouns are impossible is *situation-dependent covariation*, or President sentences (Evans, 1977). In these contexts the antecedent is a unique definite, but the anaphor refers to a different individual who has the same unique role, here that of a president, in a different context. In these contexts, null arguments allow sloppy readings which covary with situations, but overt pronouns always pick out the same individual over distinct situations.

²One interesting complication is that this effect is somewhat weaker with a human antecedent, as illustrated with the following two sentences:

- (i) zhe-jia shangdian yaome mei-you shouyinyuan_I, yaome \emptyset_I/ta_I jiu zai wuxiu.
 this-CLF store either not-have cashier or (s/he) then PROG lunch.break
 ‘Either this store does not have a cashier, or s/he is on a lunch break.’
- (ii) zhe-jia ren yaome mei-you xiaohai_I, yaome $\emptyset_I/?ta_I$ jiu bei lingyang-le.
 this-CLF people either not-have baby or (it) then PASS adopt-PERF
 ‘Either this family does not have a baby, or it is given up for adoption.’

In the first example, with antecedent *shouyinyuan* ‘cashier,’ an overt pronoun is grammatical. In the second sentence, however, the antecedent *xiaohai* ‘baby,’ is somewhere in between, with a preference for the null pronoun. The account discussed below can extend to these facts as long as human nouns like *shouyinyuan* ‘cashier’ can introduce a discourse referent in these contexts, scoping above negation, while inanimate nouns (or babies) do not.

- (14) qunian, zongtong₁ shi minzhudang ren. jinnian, #ta₁/∅₂ shi gonghedang ren.
last.year president is democrat person this.year (he) is republican person
'Last year, the president was a democrat. This year, s/he is a republican.'
- (15) zai faguo, měigeren dou xihuan zongtong. dan zai meiguo, méiren xihuan #ta₁/∅₂.
in France everyone all like president but in America nobody like (him)
'In France, everybody likes the President (=Macron). But in the US, nobody likes him (=Trump).'

In the analysis we adopt below, the index of the overt pronoun forces it to refer *de re* across situations. The null pronoun lacks an index, and, as a result, can covary along with a situation (cf. Elbourne, 2005; Schwarz, 2009). We return to an analysis of these facts in Section 4.

The next context where null and overt pronouns contrast involves *implicit antecedents*. While pronouns almost always require overt antecedents, there are a few exceptional contexts for which this restriction is weakened, such as the sentences below. In these contexts, null arguments are perfectly grammatical, but overt pronouns are not.

- (16) a. wo ruguo huaiyun-le, jiu yiding hui liuxia ∅/?ta.
I if pregnant-PERF then definitely will keep
'If I get pregnant, I will definitely keep (him/her).'
- b. wo ruoguo you-le haizi, jiu yiding hui liuxia ∅_i/ta_i.
I if have-PERF baby then definitely will keep (him/her)
'If I have a baby, I will definitely keep (him/her).'

These sentences indicate that overt pronouns require an explicit discourse antecedent, a requirement dubbed *strong familiarity* by Roberts (2003). This observation replicates the German examples in (4), where personal pronouns are possible but demonstrative pronouns are not.

Finally, *globally unique definites* only allow null anaphora as continuations, not overt pronouns:

- (17) Zhangsan xihuan yueliang_i. Lisi taoyan ∅_i/#ta_i.
Z. like moon L. hate
'Zhangsan likes the moon. Lisi hates it.'
- (18) Zhangsan xihuan yueliang. ∅/#ta zong rang ta xiangqi jiaxiang.
Z. like moon (it) always make him think.of hometown
'Z. likes the moon. It always reminds him of his hometown.'

There is a bit more speaker variation in this example. Some Mandarin speakers do not object to an overt subject pronoun in (18b), other dislike either kind of pronoun. When the overt pronoun does occur, it implicates the existence of a second moon, for example, this sentence would be fine if we lived on two-mooned Mars. Note that this kind of anti-uniqueness requirement is reminiscent of demonstratives. We propose that there is a strong pragmatic preference against using anaphoric definites for globally unique definites, even when they have discourse antecedents, perhaps because speakers do not bother to index universally available referents, where there can be no mistake about the intended referent.

3.2. Contexts allowing overt pronouns

The following three contexts are compatible with, or require, an overt pronoun.

- (19) Contexts requiring an overt index:
- a. Exophoric reference
 - b. Narrative sequences
 - c. Donkey sentences

We will argue that overt pronouns are required in these contexts because they require or prefer an overt semantic index. Tellingly, demonstrative descriptions, as anaphoric definites, are required in these contexts as well (Appendix A), a requirement that Jenks (2018) suggests is due to a principle *Index!*, which requires overt indices when they are available. However, in the contexts above some speakers still permit null pronouns, even though they may prefer for overt pronouns. We also find a subject-object asymmetry in this preference: null pronouns are more often available in subject position than object position.

First, exophoric or deictic reference requires overt pronouns; null pronouns are prohibited:

- (20) wo zhichi ta/# \emptyset . [pointing]
 I support him/her
 ‘I support him/her.’
- (21) ta/# \emptyset hen congming. [pointing]
 S/he very smart.
 ‘S/he is very smart.’

Finger-pointing supplies an assignment for an index (cf. Schlenker, 2011 on signed languages). The distinction between pronominal types in this context are robust in both subject and object position.

We turn now to anaphoric or familiar definite environments, the classic instance of which is narrative sequences (Karttunen, 1976). In these contexts an indefinite antecedent introduces a discourse referent which is taken up by a pronoun in the following sentence.

- (22) jiaoshi wai you yi-ge xuesheng_I. ta_I/ \emptyset _I kanjian-le Lisi.
 classroom outside have one-CLF student (s/he) see-PERF L.
 ‘There is a student outside the classroom. S/he saw Lisi.’
- (23) you yi-ge xuesheng zhan-zai Zhangsan bangongshi men-wai. Zhangsan
 have one-CLF student stand-at Z. office door-outside Z.
 jian-le ta_I/ \emptyset _I.
 see-PERF *(him/her)
 ‘There is a student outside Zhangsan’s office. Zhangsan meet with him/her.’

In the object position of a narrative sequence, the preference for an overt pronoun is relatively sharp. However, both anaphoric null pronouns and null arguments are possible in subject position, a fact which mirrors the distribution of bare nouns and demonstratives in these environments, as discussed further in Section 5.

The third context is donkey sentences, which have been observed to pattern with anaphoric definites in Jenks (2018). The sentences below include donkey anaphora with quantificational

antecedents and in *ruoguo* conditionals, the two ways of forming donkey dependencies in Mandarin that make use of a definite anaphor. We see that once again, a sharp contrast emerges on object position.

- (24) mei-ge you lüzi₁ de nongfu dou hui da ta₁/#∅₁.
 every-CLF have donkey DE farmer all will beat *(it)
 ‘Every farmer who owns a donkey_i beats it_i.’
- (25) yi-ge nüren₁ ruguo you haizi₂, ta₁/∅₁ jiu hui hen ai ta₂/#∅₂.
 one-CLF women if have child, she then will very love *(her)
 ‘If a woman has a child, she will love her very much.’

However, example (25) shows that null subjects allow covarying interpretations in conditionals, paralleling the exceptional availability of null subjects in narrative sequences.

The table below summarizes the distribution of overt and null pronouns in unique contexts versus what we call indexing contexts, a cover term for exophoric reference and anaphoric definite contexts.

- (26) *Distribution of ta vs. ∅*

	<i>ta</i>		∅	
	SUBJ	OBJ	SUBJ	OBJ
UNIQUE CONTEXTS				
<i>Bathroom sentence</i>	✗	✗	✓	✓
<i>President sentence</i>	✗	✗	✓	✓
<i>Implicit antecedent</i>	✗	✗	(✗)	✓
<i>Globally unique</i>	✗	✗	✓	✓
INDEXING CONTEXTS				
<i>Pointing</i>	✓	✓	✗	✗
<i>Narrative sequence</i>	✓	✓	✓	✗
<i>Donkey sentence</i>	✓	✓	✓	✗

Subjects and objects pattern together in unique and indexing contexts, with the availability of null subjects in anaphoric definite environments forming the exception, an issue we return to in Section 5. Crucially, null pronouns are always possible in both subject and object position in unique contexts, while overt pronouns are always possible in both subject and object position in indexing contexts. We conclude there exists some semantic distinction between overt versus covert pronouns which obtains in subject and object positions.

4. Pronouns as concealed definite descriptions

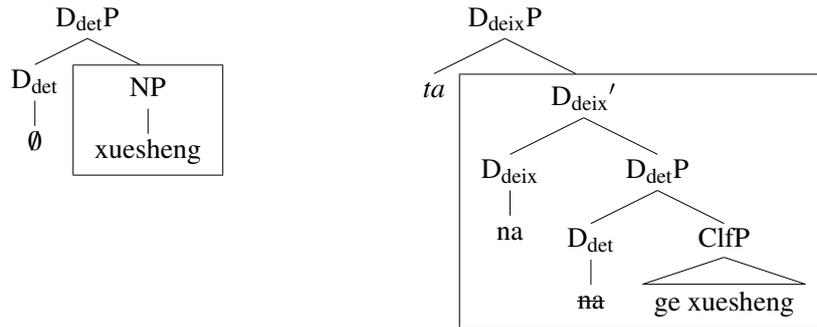
Following work by Evans (1977) and Cooper (1979), Elbourne (2001, 2005) argues that at least certain pronouns are definite articles with concealed NP complements. Patel-Grosz and Grosz (2017) extend this view to the distinction between personal and demonstrative pronouns in German, splitting DP into two projections corresponding to two types of definiteness.

- (27) a. D_{det} : the position of articles
- b. D_{deix} : a position introducing indices
- c. $D_{deix} > D_{det}$

In German, demonstrative pronouns fill both projections, *d-er*, while personal pronouns only fill the lower D_{det} . The insight behind this proposal is that anaphoric pronouns introduce indices into the semantic computation, while other pronouns rely solely on (situation-restricted) uniqueness, as in (5). The introduction of discourse-linked indices is associated with additional structure (Ihsane and Puskás, 2001; Déchaine and Wiltschko, 2003: cf.). This is exactly the semantic distinction needed to account for the distribution of null versus overt pronouns in Mandarin summarized in (26).

Similarly, we propose that null versus overt pronouns occur in distinct sub-projections of D in Mandarin (cf. Cheng et al., 2017). While null pronouns realize a null unique definite article in D_{det} , overt pronouns occur in the specifier of D_{deix} . The D head in such constructions is a demonstrative which moves up from D_{det} , or which occupies a D_{det} - D_{deix} span.

- (28) a. *Mandarin null pronoun* b. *Mandarin overt pronoun*



All but the highest overt head or specifier is deleted, the boxed portion of the tree, for both types of pronouns. This proposal is consistent with MaxElide (Merchant, 2004), which generally favors deletion of the largest available constituent.³

Evidence for the somewhat elaborate structure for overt pronouns above comes from the ability of such pronouns to occur before anaphoric demonstratives:⁴

- (29) [ta na ge xuesheng] hen congming [pointing]
- s/he that CLF student very smart
- ‘That student is very smart.’

³In the proposal of Patel-Grosz and Grosz (2017); both types of German pronouns realize D heads.

- (i) a. *German masculine singular personal pronoun er*
 [D_{detP} er <NP>]
- b. *German masculine singular demonstrative pronoun der*
 [D_{deixP} d- [D_{detP} -er <NP>]]

The difference in which constituents are deleted in German vs. Mandarin may be a simple consequence of the fact that 1) German lacks an overt indexical pronoun and 2) D_{det} cannot be deleted independent of D_{deix} in German, as they are part of the same word.

⁴These structures only occur with human head NPs. With nonhuman head NPs such as *ta na zhi gou* ‘s/he that CLF dog,’ there is a preference to interpret the pre-demonstrative *ta* as a human possessor, hence, ‘her/his dog,’ rather than simply ‘that dog’. This preference may block the inanimate interpretation of pre-demonstrative *ta*.

- (30) yi-ge xuesheng xihuan Lisi. dan Lisi taoyan [ta na ge ren].
 one-CLF student likes L. but L. dislike him/her that CLF person
 ‘A student likes Lisi. But Lisi dislikes him/her.’

Huang et al. (2009) argue at length that pronoun-complex demonstrative sequences are not appositive, but form a single DP. Our analysis makes sense of this proposal: the overt pronoun supplies an index to the demonstrative.

There are some complications with this proposal. The first is that overt pronouns are optional with complex demonstratives in anaphoric definite environments. This indicates that there must be a null variant of the index, which is nevertheless distinct from a null pronoun. But ellipsis of *Deix'* should not be possible when the pronominal index is silent, lest we wrongly predict that null pronouns are always compatible with anaphoric definite environments. Here, standard proposals about ellipsis licensing come to the rescue: as a general rule, ellipsis is only possible when specifiers are filled (Saito and Murasugi, 1990; Lobeck, 1990). So, we propose that ellipsis of *Deix'* is only licensed when its specifier is filled by an overt pronoun.

A second complication is that overt pronominal indices are impossible in some environments, such as with non-human NPs, likely due to a preference for a possessive interpretation for the pronoun in these cases (e.g. *ta na-zhi gou* ‘her/his dog’, not ‘that previously mentioned dog’). In these cases with an overt complex demonstrative, the null pronominal index may be preferred for pragmatic reasons to avoid ambiguity with the possessive interpretation. Again, ellipsis of *Deix'* should not be possible when the pronominal index is silent. So the overt index may be possible just in those cases when the *Deix'* is deleted with non-human NPs.

The semantics of the unique (\emptyset) versus anaphoric (*na*) variants of $D_{\text{det/deix}}$ are as follows (adapted from Schwarz, 2009, 2013; Patel-Grosz and Grosz, 2017; Jenks, 2018)

- (31) a. Unique D_{det} head: $t \leftrightarrow \emptyset$
 $\llbracket t \rrbracket = \lambda s_r. \lambda P_{\langle e, \langle s, t \rangle \rangle}. : \exists !x[P(x)(s_r)]. \iota x P(x)(s_r)$
 b. Anaphoric D_{det} head: $t^x \leftrightarrow na$ ‘that’
 $\llbracket t^x \rrbracket = \lambda s_r. \lambda P_{\langle e, \langle s, t \rangle \rangle}. \lambda y_e. : \exists !x[P(x)(s_r) \wedge x = y]. \iota x[P(x)(s_r)]$

In these formulae, *ta* is interpreted as a variable ranging over dynamic indices:

$$(32) \quad \llbracket ta_x \rrbracket^g = g(x)$$

This interpretation accounts for why overt pronouns, as concealed anaphoric definite descriptions — *ta* $\langle na \text{ ge ren} \rangle$ — must be used in contexts with explicit prior mention or co-speech gesture such as pointing, both of which supply the assignment function with a value for the relevant index. If the context fails to supply a value for this index, as in the contexts outlined subsection 3.1, the assignment function is undefined for this index and reference fails.⁵

These denotations are illustrated for the object president sentences in (15). These sentences are illustrative because the overt pronoun is possible, but not with the covarying, situation-

⁵The one surprise under this view is the infelicity of overt pronouns with larger situation or globally unique definites even in contexts where there is some prior mention, as in (17) and (18). Yet this context has more variability than the others; and pragmatic factors seem to be at play in preferring the null pronoun in order to avoid unwanted implicatures associated with the overt pronoun in unique definite contexts.

dependent interpretation which is available to the null pronoun. We have simplified the situation-semantic representations proposed by Elbourne (2005) for such cases for expository purposes.

Beginning with the covert pronoun, we see that covariation is available by virtue of their bound situation variable.

- (33) With \emptyset , the remnant of $\emptyset \langle zongtong \rangle$ ‘the president’
- a. $\llbracket (15) \rrbracket^g = \lambda s'. \text{in.France}(s') \wedge \forall x[\text{person}(x, s') \rightarrow \text{like}(x, \iota y[\text{president}(y, s')], s')] \wedge \lambda s''. \text{in.USA}(s'') \wedge \neg \exists x[\text{person}(x, s'') \wedge \text{like}(x, \iota y[\text{president}(y, s'')], s'')]$
 - b. ‘In the set of situations s' in France, for every x such that x is a person in s' , then x likes the unique individual y such that y is the president in s' in s' . But in the set of situations s'' in the USA, there does not exist an x such that x is a person in s'' and x likes the unique individual y such that y is the president in s'' in s'' .’

This means that no individuals in France like Macron, and no individuals in America like Trump, the unique president in the regrettable set of situations in the USA.

We now turn to the reading produced by the overt pronoun; the semantic contribution of the overt pronoun distinct from the null pronoun, which identifies a particular president with a discourse antecedent, has been underlined.

- (34) With ta , the remnant of $ta \langle na-wei zongtong \rangle$ ‘s/he that CLF president’
- a. $\llbracket (15) \rrbracket^g = \lambda s'. \text{in.France}(s') \wedge \forall x[\text{person}(x, s') \rightarrow \text{like}(x, \iota y[\text{president}(y, s')], s')] \wedge \lambda s''. \text{in.USA}(s'') \wedge \neg \exists x[\text{person}(x, s'') \wedge \text{like}(x, \iota y[\text{president}(y, s'') \wedge y = g(1)], s'')]$
 - b. ‘In the set of situations s' in France, for every x such that x is a person in s' , then x likes the unique individual y such that y is the president in s' in s' . But in the set of situations s'' in the USA, there does not exist a x such that x is a person in s'' and x likes the unique individual y such that y is the president in s'' identical to the discourse referent $g(1)$ in s'' .’

This means that no Americans like Macron, the unique presidential discourse referent. Macron must be in the range of the assignment function by virtue of his mention in the first clause.

5. Accounting for subject-object asymmetries

Table (26) shows that null pronouns are unexpectedly possible in two anaphoric contexts: narrative sequences (22) and donkey sentences (25). As predicted, this mirrors the distribution of bare nouns, which are possible in anaphoric definite environments in subject position as well:

- (35) MANDARIN NARRATIVE SEQUENCES
- a. jiaoshi li zuo-zhe yi ge nansheng he yi ge nüsheng,
classroom inside sit-PROG one CLF boy and one CLF girl,
‘There is a boy and a girl sitting in the classroom . . .’
 - b. Wo zuotian yudao #(na ge) nansheng
I yesterday meet that CLF boy
‘I met the boy yesterday.’
 - c. Wo dai gei #(na ge) nansheng yi ge liwu
I bring give that CLF boy one CLF gift
‘I’m bringing a gift for the boy.’

- d. (**na ge**) **nansheng** kan-qi-lai you er-shi sui zuoyou.
 that CLF boy look have two-ten year or-so
 ‘The boy looks twenty-years-old or so.’
- e. Wo bu renwei ?(**na ge**) **nansheng** hen youqu.
 I NEG think that CLF boy very interesting
 ‘I don’t think that the boy is very interesting.’ (Jenks, 2018: p. 510)

Anaphoric subjects cannot always be bare nouns in Mandarin; Jenks (2018) shows that one condition that licenses bare nominal subjects is their status as topics.

The correlation between bare nouns and topichood is, of course, not an analysis. There are at least two ways of thinking about the exceptionality of topics: First, it might be the case that some syntactic property of topics (e.g. a [TOPIC] feature) introduces an index in the same manner as an anaphoric or strong definite article does, bringing an index into the picture. The second kind of story is pragmatic: topics are sententially prominent, and as a result can be pragmatically associated with discourse antecedents. Evidence deciding between one of these analyses or some other one, or even a general explanatory framework for understanding them, remains out of grasp.

Aside from these topical contexts, however, Mandarin seems to always prefer explicitly anaphoric definites (overt pronouns or demonstrative descriptions) in contexts that require indices. The exceptionality of null pronouns as topical subjects mirrors the exceptionality of bare nouns as topical subjects, and so the ellipsis analysis extends cleanly to these cases as well.

6. Variation in anaphoric environments

With topical subjects set aside, the boundary between anaphoric definite expressions — both demonstratives and overt pronouns — and unique definite expressions — bare nouns and null pronouns — is quite categorical in Mandarin. This state of affairs differs from German and Japanese, where both strong pronouns (demonstrative or overt) or weak pronouns (personal or null) can occur in donkey sentences ((36)-(37)) and narrative sequences (not shown):

- (36) Wenn ein Bauer einen Esel₁ hat, dann schlägt er ihn₁ / den₁.
 if a farmer a donkey has then beats he PER DEM
 ‘If a farmer owns a donkey, then he beats it.’
 (Wiltschko, 1998: p. 172, Patel-Grosz and Grosz, 2017: p. 278)
- (37) Ronbun₁-o yon-da dono gakusee-mo sore-o₁ / Ø₁ hihinahi-ta.
 paper-ACC read-PAST which student-∀ it-ACC criticize-PAST
 ‘Every student that read a paper criticized it.’ (Kurafuji, 1999: p. 131)

These pronominal facts again seem to mirror the state of affairs for full definite descriptions in German, where both unique and anaphoric definites are possible in donkey sentences as well.⁶

- (38) Jeder Mann, der ein Haus mit Garten gekauft hat und die meiste Zeit zu Hause
 every man that a house with yard bought has and the most time at home
 verbringt, arbeitet viel {im / in dem} Garten.
 spends works much in=the_w / in the_s garden

⁶Equivalent facts have not been reported for Japanese.

‘Every man that bought a house with a yard and spends most of his time at home works a lot in the yard.’ (Schwarz, 2009: p. 45, Patel-Grosz and Grosz, 2017: p. 278)

Once again, we find that the distribution of pronouns in German and Japanese parallels the distribution of their definite descriptions. This observation in fact provides a distinct kind of argument for determiner-pronoun parallelism, because whatever must be proposed to account for the wider availability of unique definites in German (and, by conjecture, Japanese) would automatically extend to the wider distribution of null or personal pronouns in both languages.

One possibility is that the types of pronouns which are involved in the different languages are not quite the same. Specifically, what we have been observing in Mandarin is a contrast between personal pronouns and null pronouns. In German, however, the contrast is between demonstrative pronouns and personal pronouns, while in Japanese the contrast seems to be between demonstrative pronouns and null pronouns.

Another indication that the different languages have distinct pronominal contrasts at play is the fact that topicality and anti-topicality play a crucial role in German, where strong pronouns are better with non-topics (Hinterwimmer, 2015). Patel-Grosz and Grosz (2017) observe additional pragmatic factors at play such as dialect indexing. We have seen some indication of the relevance of topicality for Mandarin in that it sometimes exceptionally licenses null pronouns in subject position, as in the previous section, but topicality is often ignored in Mandarin for deference to the requirement that indices be present (e.g. (23)).

In either case, one key to understanding these different pragmatic factors would be a parallel examination of demonstrative pronouns in Mandarin, which do exist, as indicated above, in demonstrative-classifier sequence with a deleted NP complement (e.g. *na-ge (ren)* ‘that-CLF (person)’). It seems plausible that these demonstrative pronouns, if they can be so called, are in fact the closest parallel to German and Japanese demonstrative pronouns.

To summarize, the pronominal contrasts in the three languages seems to be as follows:

(39)

Pronoun type:	Demonstrative	Personal	Null
German	der	er	-
Japanese	dono	-	∅
Mandarin	na-ge	ta	∅

We have been focusing on comparing the latter two columns in Mandarin in this paper. The fact that German and Japanese both seem to involve pronominal contrasts with a demonstrative pronoun might provide an explanation for the wider distribution of the weaker member of the pronominal contrast in both languages. It might be the case, for example, that personal pronouns in German actually do have access to indices, like Mandarin personal pronouns. On the other hand, Japanese null pronouns may also have access to indices, unlike their Mandarin counterparts, explaining why they seem to occur in a wider range of contexts than in Mandarin.

7. Conclusion

The central proposal of this paper was the following principle:

- (40) *Determiner-pronoun parallelism*: Whatever distinction a language makes in its definiteness system will be mirrored in its pronominal system.

We saw that there is compelling evidence to support this view of pronouns in Mandarin. Either bare nouns or null pronouns are required in definite contexts which lack discourse antecedents. On the other hand, demonstrative descriptions and overt pronouns are only allowed in contexts where such antecedents are available.

This result has implications for the analysis of pronouns more generally. Specifically, to the extent that (40) is true across languages, it provides direct support for the D-type analysis of pronouns proposed by Elbourne (2001), extending it to null pronouns, following Tomioka (2003). In fact, the beauty of the D-type analysis of pronouns is that it captures determiner-pronoun parallelism without any additional stipulations. At the same time, this finding strengthens the growing cross-linguistic support for a mixed approach to E-type anaphora advocated by Chierchia (1995), where both dynamic binding and situations play a role in establishing anaphoric reference across sentence boundaries.

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A. *ta* – demonstrative DP and \emptyset –bare NP parallels

- (41) zhe-dong lou yaome meiyou xishoujian, yaome (#na-jian) xishoujian jiu zai qiguaide
 this-CLF building either not-have bathroom or (that-CLF) bathroom then in weird
 difang
 place
 'Either this building does not have a bathroom, or the bathroom is in a funny place.'

- (42) tushuguan yaome meiyou zixishi, yaome jiu yijing youren yuding le (#na-jian)
library either not-have study.room or then already someone reserve PERF (that-CLF)
zixishi.
study.room
'Either the library does not have a study room, or someone has already reserved the study room.'
- (43) qunian, zongtong shi minzhudang ren. jinnian, (#na-wei) zongtong shi gonghedang
last.year president is democrat person this.year (that-CLF) president is republican
ren.
person
'Last year, the president was a democrat. This year, the president is a republican.'
- (44) zai faguo, měigeren dou xihuan zongtong. dan zai meiguo, méiren xihuan (#na-wei)
in France everyone all like president but in America nobody like (that-CLF)
zongtong.
president
'In France, everybody likes President Macron. But in the US, nobody likes President Trump.'
- (45) a. wo ruguo huaiyun-le, jiu yiding hui liuxia (??na-ge) haizi.
I if pregnant-ASP then definitely will keep (that-CLF) child
'If I get pregnant, I will definitely keep the baby.'
b. wo ruoguo you-le haizi, jiu yiding hui liuxia (na-ge) haizi.
I if have-ASP baby then definitely will keep (that-CLF) child
'If I have a baby, I will definitely keep the baby.'
- (46) Zhangsan xihuan yueliang. Lisi taoyan (#na-lun) yueliang.
Z. like moon L. hate (that-CLF) moon
'Zhangsan likes the moon. Lisi hates the moon.'
- (47) Zhangsan xihuan yueliang. (#na-lun) yueliang zong rang ta xiangqi jiaxiang.
Z. like moon (that-CLF) moon always make him think.of hometown
'Zhangsan likes the moon. The moon always reminds him of his hometown.'
- (48) wo zhichi #(na-ge) ren. [pointing]
I support that-CLF person
'I support that person.'
- (49) #(na-ge) ren hen congming. [pointing]
that-CLF person very smart.
'That person is very smart.'
- (50) Zhangsan lingyang-le yi-zhi gou₁. (na-zhi) gou₁ yao-le Lisi.
Z. adopt-ASP one-CLF dog (that-CLF) dog bite- PERF L.
'Zhangsan adopted a dog. That dog bit Lisi.'
- (51) yi-ge xuesheng₁ xihuan Lisi. dan Lisi taoyan #(na-ge) xuesheng₁.
one-CL student likes L. but L. dislike (that-CLF) student
'A student likes Lisi. But Lisi dislikes the student.'
- (52) mei-ge you lüzi₁ de nongfu dou hui da #(na-xie) lüzi₁.
every-CL have donkey DE farmer all will beat (that-CLF.PL) donkey
'Every farmer who owns donkeys beats those donkeys.'
- (53) yi-ge nüren₁ ruguo you haizi₂, (na-ge) nüren₁ jiu hui hen ai #(na-ge) haizi₂
one-CLF women if have child, (that-CLF) woman then will very love that-CLF child
'If a woman has a child, the woman will love the child very much.'