Comprehension of definite and indefinite NPs by Mandarin-speaking children with specific language impairment and children with high-functioning autism

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Summary   We present an experiment to investigate whether and how Mandarin-speaking children with specific language impairment (SLI)[1] and children with high-functioning autism (HFA) who have additional language impairment differ in the comprehension of definite and indefinite noun phrases. 21 children with SLI (*Mean*=5;2, SD=0;6), 32 children with HFA (*Mean*=5;2, SD=0;6), and 28 typically developing (TD) children (*Mean*=5;3, SD=0;5) participated in the current study. We found that (1) both the SLI and HFA groups showed significantly lower accuracy in recognizing the semantic interpretation of definite NPs, as compared to the ceiling performance of their TD peers; (2) neither the SLI nor the HFA group exhibited clear difficulties with the interpretation of indefinite NPs; and (3) third-person pronouns elicited significantly higher accuracy in the SLI group than in the HFA group. These findings suggest that both children with SLI and children with HFA are challenged by the anaphoric interpretation of definite NPs. Despite the superficial similarities of language profiles, children with SLI and children with HFA still differ with each other in the knowledge of third-person pronoun.

Background   Mandarin is known to lack overt articles. The distinction between definiteness and indefiniteness is realized by NP types that inherently express (in)definite properties, and also by the constraints of word order.

Table 1 (In)Definite properties of NPs in Mandarin

Definite	Indefinite	Indeterminate
Demonstrative-Classifier NP (Dem-Cl-NP)	Numeral-classifier NP (Num-Cl-NP)	Bare NPs are definite in the subject of state-level predicate;
Pronoun	Classifier phrase (Cl-NP)	Bare NPs are definite/indefinite in the object of stage-level predicate.

Table 2 (In)Definiteness constraints of syntactic positions in Mandarin

Definite	Indefinite	Indeterminate
Subject	Complement of existential marker *you* "have"	object of stage-level predicate: it receives either definite or indefinite reading
Topic	Subject of "presentational" verbs	post-*ba*: i. bare NPs are confined to be **definite**; ii. allowing specific indefinites; iii. rejecting non-specific indefinites.

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[1] Also known as developmental language disorder (DLD) (Bishop 2017). The current research will maintain the traditional term SLI to highlight that "what is specific to these children is impairment in the domain of language" (Ruberg 2021).

Method For the comprehension of definite NPs, we designed a picture judgment task similar to van Hout, Harrigan & de Villiers (2010), in which a short context was established by two pictures appearing in sequence. When the first picture appeared, a referent was given description and therefore singled out in the introductory sentence; when the second picture appeared, a question containing a definite NP was asked. The definite NPs, which included demonstrative-classifier NPs (Dem-Cl-NP), third-person pronouns, and bare NPs, were all examined in the anaphoric environment. See figure 1 for an example:

Pictures were displayed by PowerPoint 2016 on the screen of a tablet computer.

Experimenter 1 controlled the tablet computer to present pictures, while Experimenter 2 asked questions with the assistance of prompts printed on a manual. The tablet computer was placed vertically, with screen facing towards children. Note that Experimenter 2 sit opposite the screen if Dem-Cl-NPs were tested.

(Introductory sentence)

小男孩拿着一个苹果，看到了吗？
Xiao nanhai na-zhe   yi-ge   pingguo,
little boy   take-DUR one-Cl apple,
kandao le   ma?
see   ASP SFP
The little boy has an apple in his hand, did you see?

(Waiting for children's confirmation)

(Testing sentence)

现在，苹果在哪儿？
Xianzai, pingguo zai na-er?
now   apple   at where
"Where is the apple now?"

Figure 1 Sample picture for definite NPs

In the act-out task, which targets for Num-Cl-NPs, each picture was printed on a coated paper of A4 size, and then stuck to a hard magnetic board. During experiments, the magnetic board was vertically positioned on a supporting holder, and three cartoon magnets were attached to the lower edge of the plate, arrayed horizontally. Children then picked out a cartoon magnet and stuck it to the designated position on the picture in terms of the sentence they heard. See below for an example:
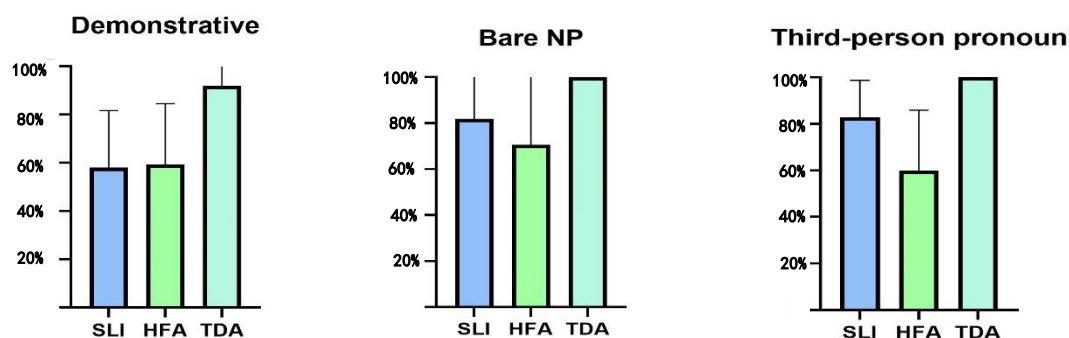
有一只蝴蝶站在自行车上
a. You yi-zhi hudie zhan zai zixingche-shang   (Target 1: a new butterfly magnet)
   have one-Cl butterfly stand on bicycle-top
   "A butterfly stands on the bicycle."
后来，蝴蝶飞到椅子上去了
b. Houlai, hudie   fei dao yizi-shang qu le   (Target 2: the one in Target 1)
   Later   butterfly fly to bench-top go ASP
   "Later, the butterfly flies into the tree."
有一只蝴蝶站在树上
c. You yi-zhi hudie zhan zai shu-shang   (Target 3: a new butterfly magnet)
   have one-Cl butterfly stand at tree-top
   "A butterfly stands on the tree."
后来，蝴蝶飞到花上面去了
d. Houlai, hudie   fei-dao hua-shangmian qu le   (Target 4: the one in Target 3)
   later   butterfly flies to flower-top   go ASP
   "Later, the butterfly flies to the flower."


Figure 2 Sample picture for Num-Cl-NPs

Results (i) For definite NPs:

| **Demonstrative**	**Bare NP**	**Third-person pronoun**
TDA and HFA groups *(p<.001)*;	TDA and HFA groups *(p<.001)*;	TDA and HFA groups *(p<.001)*;
TDA and SLI groups *(p<.001)*;	TDA and SLI groups *(p=.002)*;	TDA and SLI groups *(p<.001)*;
HFA and SLI groups *(p=1)*;	HFA and SLI groups *(p=.650)*.	HFA and SLI groups *(p=.028)*;

(ii) For indefinite Num-Cl-NPs

Num-Cl-NPs with existential verb *you*
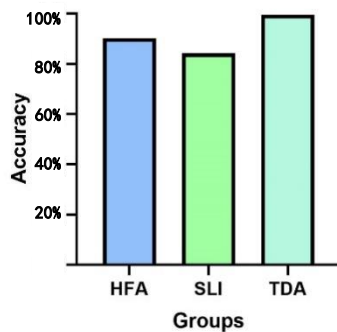
TDA and HFA groups *(p=.003)*;
TDA and SLI groups *(p=.002)*;
HFA and SLI groups *(p=1)*;

Num-Cl-NPs with "presentational" verbs
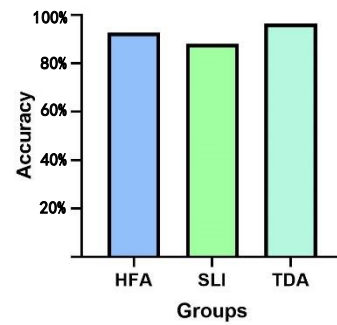
No differences were found across groups

Conclusion

Both children with SLI and children with HFA exhibited clear deficits in the comprehension of definite NPs, despite their near-target-like performance on indefinite NPs. The unbalanced development of definite and indefinite NPs in the two impaired groups suggests an unfledged DP structure. Their highly overlapping performance points to aetiological similarities of language impairment between SLI and HFA. Nonetheless, the two impaired groups still demonstrate significant difference in the comprehension of third-person pronouns. We propose that for the HFA group, the pervasive deficit in pragmatic skills to some extent inhibits the interpretation of coreferential relationship between the third-person pronoun and its antecedent, therefore leading to significantly lower accuracy as compared to that of the SLI group.

Selected reference

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