

---

Xiao He, Elsi Kaiser  
University of Southern California  
[hex@usc.edu](mailto:hex@usc.edu), [emkaiser@usc.edu](mailto:emkaiser@usc.edu)

## Reference resolution in Chinese: New insights from psycholinguistics

### Introduction

We report two self-paced reading experiments investigating Binding-Theoretic (BT) effects during real-time processing. Previous work on English produced mixed results. Badecker & Straub (2002) investigated sentences like (1) and argued that inaccessible/non-BT-licensed referents (John) are temporarily activated during reference resolution and compete with accessible/BT-licensed referents. However, Nicol & Swinney (1989) argue that inaccessible/non-BT-licensed referents do not compete (see also Sturt 2003).

(1) *John thought that Bill owed himself another chance to solve the problem.*

To enrich our understanding of factors influencing referents' ability to compete, we examined sentences where referents' accessibility depends on intervening referents' person features, namely, the Blocking Effect in Chinese: (i) If the local subject is 3rd person, the reflexive *ziji* 'self' can refer to a long-distance (LD) or a local antecedent (2b) & (2d). (ii) If the local subject is a 1st/2nd person pronoun, LD binding is blocked (2c) (Huang & Liu 2001, Pan 2000).

(2) *{Wo/Zhansan} gaosu bieren {wo/Lisi} jue de ZIJI nenggou jin hao daxue.*  
*{I/Zhangsan} told others {I/Lisi} feel SELF could get-in a good university.*

(2a) 1p-1p

*Wo1 gaosu bieren wo1 jue de ZIJI1 nenggou jin hao daxue.*  
**I1** tell others **I1** feel SELF1 can get-in good university  
'**I1** told others **I1** feel SELF1 could get-into a good university.'

(2b) 1p-3p → LD antecedent available

*Wo1 gaosu bieren Lisi2 jue de ZIJI1/2 ...*  
**I1** tell others **Lisi2** feel SELF1/2 ...  
'**I1** told others **Lisi2** feel SELF1/2 ...'

(2c) 3p-1p → LD antecedent unavailable, 'blocked'

*Zhangsan1 gaosu bieren wo2 jue de ZIJI\*1/2 ...*  
**Zhangsan1** tell others **I2** feel SELF\*1/2 ...  
'**Zhangsan1** told others **I2** feel SELF\*1/2 ...'

(2d) 3p-3p → LD antecedent available

*Zhangsan1 gaosu bieren Lisi2 jue de ZIJI1/2 ...*

**Zhangsan**<sub>1</sub> tell others **Lisi**<sub>2</sub> feel SELF<sub>1/2</sub> ...  
'**Zhangsan**<sub>1</sub> told others **Lisi**<sub>2</sub> feel SELF<sub>1/2</sub> ...

Although these facts are standardly reported in the literature, native speaker judgments suggest that Blocking effects may be less absolute than is often assumed. Thus, in addition to (i) probing the effects that person-feature Blocking has on the availability of potential antecedents during real-time processing, we also (ii) test whether naïve Chinese speakers exhibit Blocking effects with 1p/2p interveners. We use offline comprehension question data and on-line reading times to test whether intervening 1p/2p pronouns block LD referents from competing with local antecedents.

To gain insights into the reasons underlying Blocking, (iii) we also tested whether 1p and 2p differ. Existing research disagrees regarding the underlying reasons for Blocking (e.g., perspective-taking, animacy, feature checking, Huang & Liu 2001, Pollard & Xue 1998, Cole & Wang 1996). We explore a novel prediction related to perspective-taking: non-BT work by Brunyé et al. (2009) found that in multi-sentence discourses, 2p pronouns were actually more effective at inducing perspective-taking than 1p. Specifically, comprehenders are more likely to take the perspective of 2p than 1p. If Chinese Blocking effects are attributable to perspective taking, we may find stronger Blocking with 2p than 1p.

## Experiments

In *Experiment 1*, we manipulated matrix and embedded subjects (1<sup>st</sup> person pronoun/3<sup>rd</sup> person name) in a self-paced reading experiment with 4 conditions: (a) 1p-1p: both matrix and embedded subjects are 1p (2a); (b) 1p-3p: Matrix subject is 1p; embedded subject is 3p (2b); (c) 3p-1p: matrix is 3p; embedded is 1p (2c); (d) 3p-3p: both are 3p (2d). Twenty participants read sentences word-by-word; reading times (RT) were recorded. Forced-choice questions testing interpretation of *ziji* followed targets (n=32). *Experiment 2* had the same design but now 2p pronouns were used instead of 1p. Twenty-eight new participants took part in Experiment 2.

(3) Sample forced-choice question for (2d):

*Shui neng jin hao daxue?*  
Who can get-in good university  
'Who can get in a good university?'  
(A). Zhangsan or (B). Lisi

## Predictions

**Antecedent choices:** If Blocking determines final interpretation, the LD antecedent should be available in 1p-3p/2p-3p and 3p-3p, but crucially not in 3p-1p/3p-2p, due to intervening 1p/2p.

**RTs:** According to prior work, RT slowdowns indicate competition. 1p-3p, 2p-3p and 3p-3p should exhibit slowdown from matrix-vs.-embedded-subject competition because both LD and local referents are accessible. 1p-1p/2p-2p should show no competition/slowdown because only one referent is present. If *inaccessible referents are filtered out* (Nicol & Swinney 1989), 3p-1p/3p-2p should show no competition/slowdown. If *inaccessible referents compete* (Badecker & Straub 2002) and the matrix subject is prominent enough, 3p-1p/3p-2p should exhibit

competition/slowdown. RTs were trimmed and log-transformed, and dependent variables were centered to reduce multicollinearity. Data were primarily analyzed with mixed-effects regression (Baayen et al. 2008, Jaeger 2008).

## Experiment 1 Results

**Antecedent choices:** Antecedent choices reveal a *bias for local subjects* (3p-3p: 85.7% local subject, 1p-3p: 95.9%, 3p-1p: 73.1%,  $p$ 's<0.001). Strikingly, this preference is significantly weaker in 3p-1p (26.9% matrix subject choices,  $p$ 's<.025), the condition where Blocking predicts the matrix subject to be unavailable.

**RTs:** At *ziji* and onwards, RTs in 1p-3p, 3p-3p and 3p-1p were significantly longer than in 1p-1p, suggesting that even in 3p-1p, the matrix subject was not blocked from competing. (3p were overall slower than 1p; this is expected (cf. Warren & Gibson 2005) and not crucial here.)

**Response-contingent analysis:** However, could 3p-1p slowdowns be driven by the subset of trials where participants (unexpectedly) chose the matrix subject (violated Blocking)? If we analyze trials where participants chose the local subject (Blocking is effective), will we still see competition from the matrix subject? When we look only at trials with local-antecedent-interpretations, slowdowns in 3p-1p are no longer significant.

In sum, (i) 1p does not consistently block access to the matrix subject, (ii) but when it does (Blocking is effective), Blocking is strong enough to reduce competition from the matrix subject.

## Experiment 2 Results

**Antecedent choices:** Again we found a strong bias for local subjects (3p-3p: 87% local subject, 2p-3p: 100%, 3p-2p: 93.8%,  $p$ 's<0.001). 3p-2p shows a stronger local preference than 3p-1p in Exp1 ( $p$ <.005): An intervening 2p produces a more consistent blocking effect than 1p.

**RTs:** 3p-2p was not significantly slower than 2p-2p (marginally slower,  $p$ =.069), suggesting 3p is not accessible enough to cause a significant slowdown. As a whole, it appears that an intervening 2p may be a stronger blocker (and may reduce competition more) than an intervening 1p.

## Conclusions

Our results suggest that person-feature blocking can reduce competition during on-line processing, but that 2p pronouns block more effectively than 1p pronouns, as illustrated by antecedent choices and reading times. On the basis of Brunyé et al.'s (2009) findings, this difference in patterning between 1st person pronoun and 2nd person pronoun may be caused by perspective taking: We suggest that identifying with the addressee (2p pronoun) leads comprehenders to more consistently interpret the reflexive as referring to the addressee (local 2p subject), resulting in a consistent blocking effect.

## References

- Baayen, R.H., Davidson, D.J. and Bates, D.M. 2008. Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language* 59, 390-412.
- Badecker, W. and Straub, K. 2002. The processing role of structural constraints on the interpretation of pronouns and anaphors. *Journal of Experimental Psychology: Learning, Memory and Cognition* 28, 748-769.

- Brunyé, T.T., Ditman, T., Mahoney, C.R., Augustyn, J.S. and Taylor, H.A. 2009. When you and I share perspectives: pronouns modulate perspective taking during narrative. *Psychological Science* 20, 27-32.
- Cole, P. and Wang, C. 1996. Antecedents and blockers of long-distance reflexives: the case of Chinese *ziji*. *Linguistic Inquiry* 27(3), 357-390.
- Huang, C.-T. J. and Liu, C.-S. L. 2001. Logophoricity, attitudes and *ziji* at the interface. In *Syntax and Semantics* [Long Distance Reflexives 33], Cole, Petter, Hermon, Gabriella and Huang, C.T. James (eds.), 141-195. New York: Academic Press.
- Jaeger, T.F. 2008. Categorical data analysis: away from ANOVAs (transformation or not) and towards Logit Mixed Models. *Journal of Memory and Language* 59, 434-446.
- Nicol, J. and Swinney, D. 1989. The role of structure in coreference assignment during sentence comprehension. *Journal of Psycholinguistic Research* 18, 5-19.
- Pan, H. 2000. Why the blocking effect? In *Syntax and Semantics* [Long Distance Reflexives 33], Cole, Petter, Hermon, Gabriella and Huang, C.T. James (eds.), 279-316. New York: Academic Press.
- Pollard, C. and Xue, P. 1998. Chinese reflexive *ziji*: syntactic reflexives vs. nonsyntactic reflexives. *Journal of East Asian Linguistics* 7, 287-318.
- Sturt, P. 2003. The time-course of the application of binding constraints in reference resolution. *Journal of Memory and Language* 48, 542-562 .
- Warren, T. and Gibson, E. 2005. Effects of NP type in reading cleft sentences in English. *Language and Cognitive Processes* 20(6), 751 -767.
-