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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} juede 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 juede ZIJI1   nenggou jin   hao   daxue.
   I1   tell   others **I**1 feel SELF1   can   get-in good university
   '**I**1 told others **I**1 feel SELF1 could get-into a good university.'

(2b) 1p-3p → LD antecedent available

   Wo1 gaosu bieren Lisi2 juede ZIJI1/2 …
   I1   tell   others **Lisi**2   feel SELF1/2 …
   '**I**1 told others **Lisi**2 feel SELF1/2 …

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

   *Zhangsan1 gaosu bieren wo2 juede ZIJI*1/2 …*
   Zhangsan1 tell   others **I**2   feel   SELF*1/2 …
   '**Zhangsan**1 told others **I**2 feel SELF*1/2 …

(2d) 3p-3p → LD antecedent available

   Zhangsan1 gaosu bieren Lisi2 juede ZIJI1/2 …

Zhangsan1 tell   others **Lisi**2   feel   SELF1/2 …
'**Zhangsan**1 told others **Lisi**2 feel SELF1/2 …

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 (1st person pronoun/3rd 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, 2p3p 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.

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