Locality rules out variable binding in coreference resolution

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Introduction: Two mechanisms are assumed in pronoun interpretation (e.g., Grodzinsky and Reinhart, 1993): *Variable binding* is employed for c-commanding referents, the matrix subject in (2); *coreference* applies for non c-commanding referents, the NP in the relative clause in (2). In Primitives of Binding (POB) (Reuland, 2001) syntax/semantic variable binding is claimed to require less processing costs than discourse-based coreference (Runner and Head, 2014). Conversely, Cunnings et al. (2014) proposed that the linearly most recent NP is preferred in pronoun interpretation. We set out to investigate whether recency or interpretive mechanism influences the interpretation of the structurally ambiguous German possessive *seinen* 'his' as in (2). Contexts (1) are used to introduce the possessed element (e.g., *Vater* 'father' in (2)) of either *Fritz* in (1-a) or both *Fritz* and *Ernst* in (1-b) leaving the pronoun reference in (2) ambiguous. Antecedents were presented in two positions (2). In a disambiguating context (1-a), the pronoun requires coreference for the non c-commanding referent (2-a) but variable binding for the matrix subject (2-b).

(1)   a.   . . . Fritzs Vater wird   bei Ausfällen   in der Regel angerufen.
             Fritz's father will be in   cancellation usually   called
      b.   . . . Fritz und Ernst müssen ihre Väter   anrufen.
             Fritz and Ernst must   their fathers call
(2)   a.   . . . hatte Ernst$_i$, den Fritz$_j$ eigentlich kennt, unverzüglich **seinen**$_{i/j}$ Vater per Handy   angerufen.
             has   Ernst   who Fritz   actually   knows immediately **his**   father by cell phone called
      b.   . . . hatte Fritz$_i$, den Ernst$_j$ eigentlich kennt, unverzüglich **seinen**$_{i/j}$ Vater per Handy   angerufen.
             has   Fritz   who Ernst   actually   knows immediately **his**   father by cell phone called

      If coreference is more costly than variable binding as predicted by POB (Reuland, 2001), more processing difficulty is expected for the pronoun in (2-a) than for the pronoun in (2-b) in an unambiguous context. In contrast NP recency (Cunnings et al., 2014) predicts processing facilitation in (2-a) for a coreference interpretation compared to variable binding in (2-b).

Method: Contexts (1) and sentences in self-paced reading (2) (n=24) were presented to German natives (n=60). Questions targeting the pronoun interpretation were asked. In ambiguous contexts, the matrix subject was labelled as "correct" referent. Four Latin square lists included 36 randomly interspersed fillers.

Results: Lower accuracies were observed for (2-b) vs (2-a) in unambiguous contexts (Fig. 1). In the pronoun region, ambiguous contexts revealed significantly longer reading times (RTs) than unambiguous contexts. For the possessed noun region, shorter RTs were found in (2-a) vs (2-b) for unambiguous contexts and longer RTs in (2-a) vs (2-b) for ambiguous contexts (Fig. 2).
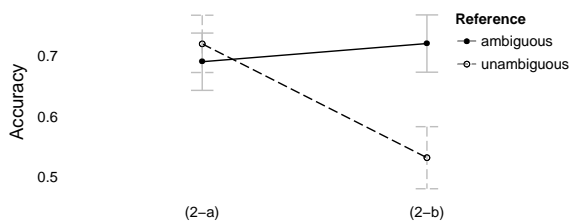

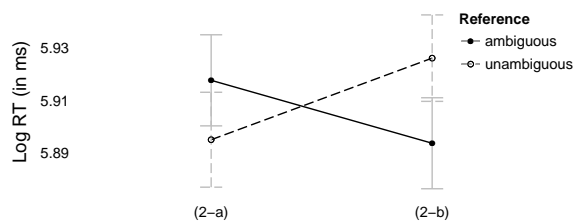**Fig. 1:** Question response accuracy (with 95% CIs)

Fig. 2: RT in possessed noun region (with 95% CIs)

Discussion: Recency facilitation in unambiguous contexts was seen in response accuracy and RTs. The ambiguity effect shows that both antecedents were considered for the dependency computation. These results show processing advantage for more recent NPs in pronoun resolution and suggest that variable binders have no precedence over coreferent NPs during on-line processing.