**Abstract**

An important current research question in psycholinguistics concerns the mechanisms through which different interpretations of superficially similar constructions can arise across languages. For example, Hemforth et al. (2003) observed cross-linguistic variation in sentences like (1). In German, listeners prefer to resolve the pronoun to the subject (also Bosma & Hops 2007) while, in French, they are most likely to interpret the pronoun as referring to the object.

(1) Le facteur rencontré le taureau a avant qu’il rentre à la maison. 
   b. Puis il rentre à la maison.

(2) Der Briefträger traf den Straßenfeger. 
   a. bevor er nach Hause ging. 
   b. Dann ging nach Hause.

The postman met the street sweeper before he went home. / Then he went home.

Burnett & Hemforth (2017) propose a computational model of differences in pronoun resolution preferences between German and French: active sentences within the RSA framework that take into account differences in the inventory of syntactic constructions between them. The model predicts the patterns of pronoun reference observed in experiments based on a high prior probability of next mention of subjects (see Arnold 2001) and a higher cost for the speaker producing the active construction for subject antecedents for which an alternative infinitival construction is available (avant de rentrer à la maison) in French but not in German. This paper extends this model to pronoun resolution in passive sentences.

**Conclusion**

Crosslinguistic differences in pronoun resolution preferences can be derived from aspects of the morphology and syntax of the different languages in a Bayesian signaling game framework (like RSA). We can explicitly show that differences in the hard (grammaticality) and soft (preferential) distribution of PRO across German and French generate differences in overt pronoun interpretation.

To account for preferences for the passives, we conclude that:

- the “avant que” construction may induce slightly lower costs for passives contributing to the preference change, but the effects are not very strong.
- therefore, increased priors for the subject being mentioned next following a passive seems to be the more probable candidate for the change in antecedent preference.

**An RSA Architecture for crosslinguistic differences in pronoun resolution**

RSA models formalize aspects of Grecian reasoning in terms of signaling games with an iterated best response cycle solution concept. We assume that French and German differ only in the properties of their messages: the M component of the game. We use the iterated RSA solution concept for all three games. 

<table>
<thead>
<tr>
<th>S is the speaker; L is the listener</th>
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Propositions under consideration: The individual denoted by the subject went home (p0)

The individual denoted by the object went home (p0)

Following Arnold (2001), we assume that hearing a DP in subject position increases L’s expectation that this DP will serve as a referent in the subsequent discourse. We therefore take L’s belief after hearing the main clause, but prior to hearing the nid/avant pronoun, to be represented by the prior probability distribution P(p0) = 0.95, P(p0) = 0.05.

Unlike German, French possess variants of (b) containing a null PRO (2) which is obligatorily interpreted as referring to a subject (Cherizia 1989). (2) ... avant de rentrer à la maison... before going home.

**Acceptability judgment task**

To distinguish between and to, we carried out an acceptability study with comprehension questions (e.g. who went home?) comparing the conditions in Table 2 (38 participants, 16 items, on-line). Participants were recruited on the RISC website. The 16 items were interspersed with 49 fillers.

<table>
<thead>
<tr>
<th>Passive</th>
<th>Avant que</th>
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<tbody>
<tr>
<td>Marie a été appelée par Pierre avant qu’elle rentre à la maison</td>
<td>Marie a été appelée par Pierre avant qu’elle rentre à la maison</td>
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<td>Marie a été appelée par Pierre avant qu’elle rentre à la maison</td>
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**Table 1. Model predictions for subject choices and corresponding data from Hemforth et al. (2003).**

<table>
<thead>
<tr>
<th>German</th>
<th>French</th>
</tr>
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<tbody>
<tr>
<td>Item</td>
<td>Costs</td>
</tr>
<tr>
<td>A</td>
<td>0.15</td>
</tr>
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**Table 2. Example of sentences of the acceptability judgment task.**

**Procedure**

Participants read each sentence and judged the acceptability on a scale from 1 (unacceptable) to 10 (fully acceptable). After each sentence, they answered a comprehension question testing their understanding of the pronoun/PRO.

**Participants**

- 38 French native speakers, 18 men in Paris

**Results**

Figure 1. Acceptability judgments

Figure 2. Percentage of subject choices

Participants chose about equally often the subject as an antecedent for active: for passives 84% for active, 87% for passive for the ambiguous “avant que” construction (p >0.2). 98% of subjects were correctly chosen for the unambiguous “avant que” construction. “Avant que” was marginally (p<0.09) more acceptable for active than for passive (88% vs. 10% for active, 82% vs. 0% for passive). For both, active and passive, the “avant que” construction was more acceptable than the “auvant que” construction (active: 82% vs. 77%; all p < 0.05) and there was a marginal interaction with active showing a larger penalty for the “auvant que” construction than passives (p<0.09).

**References**

Burnett, Heather, and Barbara Hemforth. A Bayesian Game-Theoretic Approach to Cross-Linguistic Variation In Xing, 2017.