Individual Differences in Attachment Preferences

Aurora Mendelsohn and Neal J. Pearlmutter, Northeastern University

Attachment Preferences

Relative Clause (RC) Attachment Ambiguity:

The crowds annoyed the chauffeur of the actor who wanted to go home.

- English speakers prefer to attach the RC to the second NP (N2) e.g. *the actor* (Cuetos and Mitchell, 1988).
- Spanish speakers prefer to attach the RC to the first NP (N1) e.g. *the chauffeur* (Cuetos and Mitchell, 1988).
- Preferences tend to be weak, especially in on-line studies (Carreiras & Clifton, 1993).
- Prepositions connecting the two potential attachment sites (e.g. *of*) influence preferences. (Gilboy et al., 1995).

Individual Differences in Working Memory (WM)

- Individual differences in WM have been found to influence lexical and syntactic ambiguity resolution (Miyake et al., 1994; Pearlmutter and MacDonald, 1995).
- Individual differences in WM have been considered differences in experience (Pearlmutter & MacDonald, 1995)
- Exposure to one attachment pattern influenced preferences in children (Mitchell, 1994)
- WM differences might provide insight into this ambiguity.

References

Carreiras, M., & Clifton, C. (1993) Relative clause interpretation preferences in Spanish and English. *Language & Speech*, **36**, 353-372.

Cuetos, F., & Mitchell, D. C. (1988) Cross-linguistic differences in parsing: Restrictions on the use of the Late Closure strategy in Spanish. *Cognition*, **30**, 73-105.

Cuetos, F., Mitchell, D. C, Corley, M. (1996) Parsing in different languages. In M. Carreiras, J. Garcia-Albea & N. Sebastian-Galles (Eds.) Language processing in Spanish (pp.145-187). Mahwah, NJ, Lawrence Erlbaum.

Daneman, M., & Carpenter, P. A. (1980) Individual differences in working memory and reading. *Journal of Verbal Learning and Verbal Behavior*, **19**, 450-466.

Frazier, L. & Clifton, C. (1996) Construal. Cambridge, MA: MIT Press.

Gilboy, E., Sopena, J.-M., Clifton, C., & Frazier, L. (1995) Argument structure and association preferences in Spanish and English complex NPs. *Cognition*, **54**, 131-167.

Konieczny, L., Hemforth, B. Scheepers, C., & Strube, G. (1997) The role of lexical heads in parsing: Evidence from German. *Language and cognitive Processes*, **12**, 307-348.

Mitchell, D. C. (1994) Sentence parsing. In M. A. Gernsbacher (Ed.), Handbook of psycholinguistics (pp. 375-409). San Diego, CA: Academic Press.

Miyake, A., Just, M., & Carpenter, P. (1994) Working Memory constraints on the resolution of lexical ambiguity: Maintaining multiple interpretations in neutral contexts. *Journal of Memory and Language*, **33**, 175-202.

Pearlmutter, N. J., & MacDonald, M. C. (1995) Individual differences and probabilistic constraints in syntactic ambiguity resolution. *Journal of Memory and Language*, **34**, 521-542.

Experiment 1

- Contrast two types of *of* (Gilboy et al., 1995) :

Functional / Occupational:

The crowds annoyed the chauffeur of the actor who wanted to go home.

Representational:

The artist recognized the sketch of the house that was mentioned in the book.

- Free-choice questionnaire was used to ensure that subjects were not alerted to alternatives, as opposed to forced-choice used in previous studies.

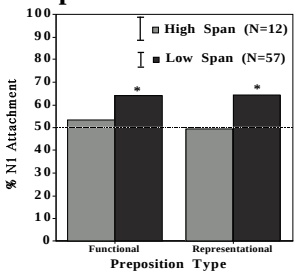
Method

- 10 functional, 10 representational sentences
- N1 and N2 were both animate or both inanimate and both singular or both plural.
- N1 and N2 attachments were controlled for plausibility.
- Free-choice questionnaire: experimental items were followed by a question about the attachment, with space for an answer:

Who wanted to go home?_____

- 60 filler sentences (each followed by a question).
- Daneman and Carpenter (1980) reading span task classified subjects as high span (span >= 4) or low span (span < 4).

Experiment 1 Results



*** = Different from chance,**
Error bars show 95% CI for cell mean differences

- Span Effect: Low span subjects preferred N1 attachment; high span subjects showed no preference.
- The *of* types did not differ and there was no interaction.

Experiment 2

- Examine *of* types along with other prepositions:

Locatives:

The tourists went to the store near the beach that was crowded and hot.

With:

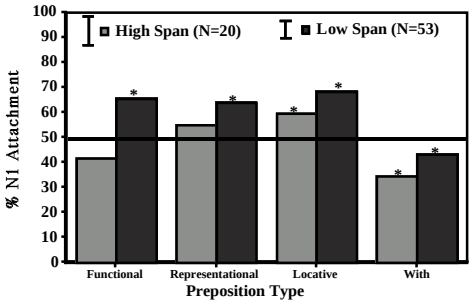
The personal assistant recommended the dress with the lace that was imported from France.

- Locatives and *with* attach as adjuncts and not as arguments. Theories (e.g., Frazier & Clifton, 1996) that use this distinction to explain the difference between *of* and *with* predict that locatives will pattern with *with*.

Method

- 10 locatives, 10 *with* items and 20 *of* items from Exp 1.
- N1 and N2 attachments were controlled for plausibility.
- Same free-choice questionnaire method as Exp 1.
- 61 filler sentences (each followed by a question).

Experiment 2 Results



*** = Different from chance**
Error bars show 95% CI for cell mean differences

- Span Effect: Low span subjects preferred N1 attachment more than high span subjects did.
- Preposition Effects: *With* elicited N1 attachment preferences less than the other prepositions.
- Interaction: For High span subjects, functional of displayed the same low N1 attachment preference as *with*. Low span subjects did not show this effect.

Summary and Conclusions

- The difference between *of* and *with* cannot be explained by an argument/ adjunct distinction because locatives (also adjuncts) did not pattern with *with*.
- High span subjects' lack of N1 preference in functional *of*s could be due to an ability use the knowledge that in the N1 case, another (unambiguous) genitive form (e.g. *the actor's chauffeur*) is available.
- Weak preferences in previous studies could be due to varying ratios of high to low span subjects.

Possible Explanations of Span Differences

- Tuning, Garden Path, Constural and Parameterized Head Attachment (Mitchell, 1994; Frazier and Clifton, 1996; Konieczny, et al., 1997) do not predict this difference, but could be compatible, given a mechanism to handle span differences.
- The Syntactic Prediction Locality Theory (Gibson, 1998) seems incompatible with these differences.
- A possible explanation for the span differences is that low span subjects focus on the matrix verb and its arguments (including N1) more than on elements deeper in the structure. So, N1 may be more active than N2, and thus more likely to be chosen. High span subjects may be able to keep all of the elements relatively active for attachment.
- Planning on-line study to replicate findings and test above prediction.

Plausibility Norming

- N1 and N2 versions of the items used in both experiements

N1: the chauffeur who wanted to go home

N2: the actor who wanted to go home

- 60 fillers, 62 subjects, scale:1-7 (7= most plausible)
- No significant differences in plausibility.

Plausibility by Condition

Item Type	N1	N2
Functional *of*	5.18 (.47)	5.24 (.82)
Representational *of*	5.07 (.49)	5.37 (.43)
Locative	4.65 (.85)	5.05 (.47)
With	5.26 (.43)	5.06 (.63)

Note: standard deviations in brackets