

Noun Modification Preferences in Hindi

Shravan Vasishth (Potsdam, Germany)

Rama Kant Agnihotri (Delhi University)

Eva M. Fernández (Queens College, City University of New York)

Rajesh Bhatt (University of Massachusetts, Amherst)

May 1, 2005

Introduction

There is considerable language-dependent variation in relative clause attachment preferences, which is puzzling given the otherwise universal principles that appear to guide the processing of many other constructions. For example, a relative clause in English like the one in the following example will be preferably interpreted as attached to the local noun, *actress*.

- (1) Someone hit the maid of the actress who was on the balcony.

However, in Spanish (2) the preference is for non-local attachment to the first noun *criada* ((Cuetos & Mitchell, 1988), among others).

- (2) Alguien pegó a la criada de la actriz que estaba en el balcón
someone hit dat the maid of the actress who was on the balcony
‘Someone hit the maid of the actress who was on the balcony.’

Some other languages that behave like Spanish include French (Mitchell, Cuetos, & Zagar, 1990), Italian (De Vincenzi & Job, 1993), German (Hemforth, Konieczny, & Scheepers, 1994), and Dutch (Brysbaert & Mitchell, 1996). The cross-linguistic differences in relative clause attachment are most robust and replicable when examined with offline methods, e.g., questionnaires presenting ambiguous sentences as those in the examples and asking readers directly about the interpretation of the relative clause.

The position of the relative clause differs cross-linguistically, depending on the language’s grammar. Consider the head-final language Japanese (3). Here, the *X of Y* complex can only be realized as *Y’s X*, and RCs appear prenominal. The attachment preferences for Japanese are discussed in (Kamide & Mitchell, 1997), among others.

- (3) a. Dareka-ga barukonii-ni iru joyuu-no mesitukai-o utta
Someone-nom balcony-loc is actress-gen servant-acc shot
‘Someone shot the actress’ servant who was on the balcony.’

A number of questionnaire studies have confirmed that relative clause (RC) length modulates attachment preferences, this finding lending support to the idea that implicit prosody might guide ambiguity resolution (Fodor, 2002).

In fact, even in English longer RCs are more likely to be preferentially attached to the main (non-local) noun (4). This length effect has a compelling explanation in terms of implicit prosody (Fodor, 2002). Studies examining the explicit

prosody produced by speakers of a number of languages have found that long RCs, compared to short ones, are more likely to be preceded by a phrasal break (Fernández, Bradley, & Taylor, 2005; Fernández, Bradley, Igoa, & Teira, 2003). On the assumption that explicit prosody reflects the properties of the prosody projected implicitly during silent reading, Fodor argues that implicit prosody might be the source for the length effect in the (silent reading) questionnaire studies. For long RCs, a major prosodic discontinuity at the RC's left edge (projected implicitly) prompts syntactic realignment, i.e., attachment to the non-local head, so that a major syntactic discontinuity coincides with the major prosodic discontinuity.

(4) Someone saw the maid of the actress who cried (right through the night).

In order to understand RC attachment ambiguity better, it is vital to extend the cross-linguistic empirical base. Towards this end we investigated a relatively understudied language, Hindi.

In the remainder of this paper, we report a questionnaire study that furnishes answers to two questions: (i) are attachment preferences in Hindi local or non-local? (ii) does the length of the RC determine the attachment preference? Answering the first question extends the database of languages studied to date with this construction; answering the second question offers an opportunity to subject Fodor's implicit prosody hypothesis to (indirect) empirical test. We first discuss the structural configuration of the possessive NP construction in Hindi, and then illustrate the various RC attachment possibilities in this structure. The questionnaire experiment is then described and the results discussed.

Possessive noun phrase structures in Hindi, and two possible relative clause configurations

In Hindi, the possessive construction *the maid of the actress* can only be instantiated, like in Japanese, as the construction *actress' maid*:

- (5) abhinetrii-kii naukaraanii
actress-gen maid
(The) actress' maid.

There are at least two syntactic arguments for assuming that the first NP and the genitive marker form a constituent: (i) the first NP, along with the genitive, can be displaced to the left edge of the structure, (6a) but the first NP alone cannot (6b); and (ii) the second NP (6c) can be displaced leftwards.

- (6) a. Ram-kii_i Sita-ne [_i kitaab] chupaa-dii hai
Ram-gen Sita-erg t book hid has
'(Literal:) Ram's Sita has hidden book. (Sita has hidden Ram's book.)'
- b. * Ram_i Sita-ne [_i kii kitaab] chupaa-dii hai
Ram Sita-erg t gen book hid has
'(Intended:) Sita has hidden Ram's book.'
- c. vo naukaraanii_i [abhinetrii-kii t_i] hai
that maid actress-gen t is
'That maid is the actress.'

Accordingly, we assume a syntactic configuration as shown schematically in (7) below. Here, the numerical subscript on each NP refers to the left-to-right linear order of occurrence of each NP.

(7) [[NP₁ gen] NP₂]

Now, relative clauses in Hindi can take many different forms ((Dayal, 1996), among others). Two obvious ones are exemplified below, but we stress that this is not an exhaustive listing of structures that speakers build in realistic speech.

The two RC modification strategies are postnominal and prenominal attachment, as shown in (8a) and (8b), respectively.

- (8) a. *kisii-ne usa abhinetrii-kii usa naukaraanii-ko [jo caaye
 someone-erg that actress-gen that maid-acc who tea
 pii rahii-thii] maara
 drinking was hit
 ‘Somebody hit the actress’ maid who was drinking tea.’*
- b. *kisii-ne [caaye pii rahii] usa abhinetrii-kii usa
 someone-erg tea drinking was that actress-gen that
 naukaraanii-ko maara
 maid-acc hit
 ‘Somebody hit the actress’ maid who was drinking tea.’*

In each case, the relative clause can in principle modify either NP as long as no syntactic (e.g., gender) or semantic-pragmatic information disambiguates. In the above examples, no such disambiguation is possible since both NPs are feminine and singular, and both referents are equally likely to be drinking tea.

Experiment

60 Hindi native speakers read 24×4 ambiguous target sentences (9a,b) each followed by a question like (10) probing RC’s interpretation.

Before the final target sentences were prepared, an informal norming study was carried out to limit the target sentences to those containing NP pairs with approximately equally likely attachment of the associated relative clause. Target materials combined factorially the manipulations illustrated: RC's Length (short/long) and RC's Placement (prenominal/postnominal). Four counterbalanced lists were prepared and subjects were assigned to each list pseudo-randomly in the standard fashion. The experimental items and instructions to subjects are available from the first author.

- (9) a. *kisii-ne [(balkonii par kharīi) caaye pii rahii] us*
 someone-erg (balcony on standing) drinking tea was that
abhinetrii-kii us naukaraanii-ko maaraa
 actress-gen that maid-acc hit
 'Someone hit that maid of that actress who was (standing on the balcony) drinking tea.'
- b. *kisii-ne us abhinetrii-kii us naukaraanii-ko jo [(balkonii*
 someone-erg that actress-gen that maid-acc who (balcony
para kharīi) caaye pii rahii thii] maaraa
 on standing) drinking tea was aux hit
- (10) *caaye kaun pii rahii thii? (a) abhinetri (b) naukaranii*
 tea who drinking was (a) actress (b) maid
 'Who was drinking tea? (a) actress (b) maid.'

Results

An omnibus ANOVA was performed on both subject- and item-based summary values of the data, expressed as percent attachment to the complex NP's

head, *naukaraanii*.

The omnibus ANOVA shows a main effect of Position ($F(1,59) = 164.75$, $p < 0.01$; $F(1,23) = 132.33$, $p < .01$), a marginal main effect of Length only in the by-subjects analysis ($F(1,59) = 3.84$, $p = 0.0550$; $F(1,23) = 2.30$, $p = 0.145$), and a marginal Length \times Position interaction but again only in the by-subjects analysis ($F(1,59) = 3.20$, $p = 0.0789$; $F(1,23) = 2.31$, $p = 0.144$).

Examining the length effect separately for prenominal and postposed RCs showed that with prenominal RCs, the length effect approached significance ($F(1,59) = 4.44$, $p = 0.0395$; $F(1,23) = 2.65$, $p = 0.119$), while with postnominal RCs, it did not ($F(1,59)$, $F(1,23) < 1$).

In line with findings in other languages (including Spanish and Japanese), prenominal RCs in Hindi are interpreted as attached to the complex NP's head: 61% for long, 53% for short (a difference that is marginally reliable). In contrast, postnominal RCs are overwhelmingly interpreted as attached to the complex NP's head noun, regardless of RC's length, at a rate of 93%. These results are summarized in Figure 1.

Discussion

The results are not inconsistent with Fodor's Implicit Prosody Hypothesis. A length effect, attributed by Fodor to the influence of implicit prosody in silent reading, was marginally significant with prenominal materials. In addition, the

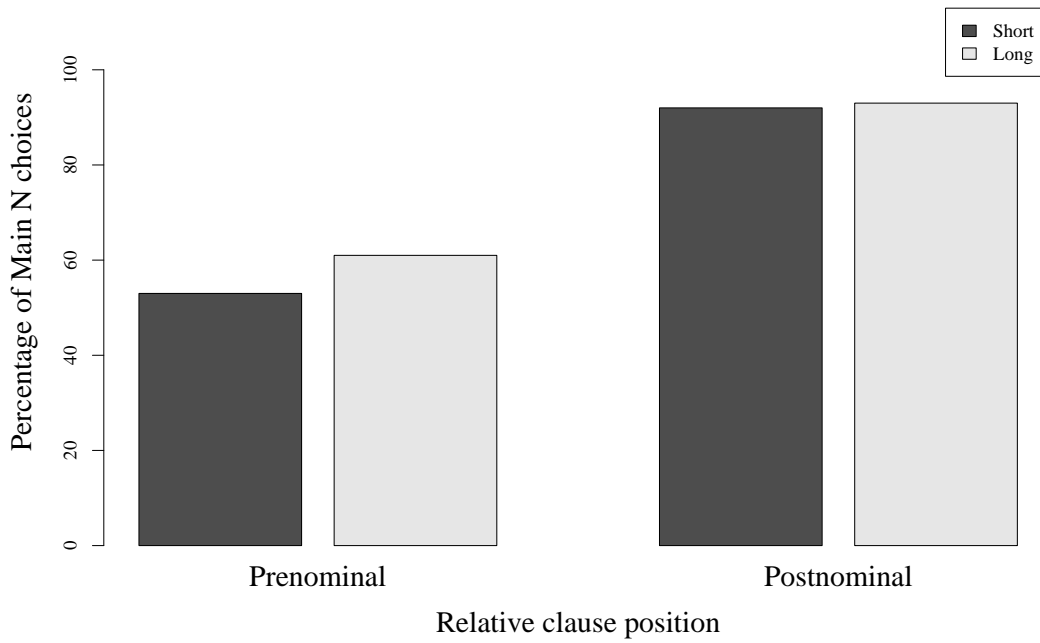


Figure 1: Percentage attachment preferences of short and long prenominal and postnominal relative clauses to the complex NP's head.

data reveal what might be described as a preference to interpret the RC as referring to a linearly proximate noun, above and beyond the overall preference to attach to the main NP. For prenominal materials, the more linearly proximate element would be the possessor, *actress*, while for postnominal materials it would be the possessum, *maid*.

Alternatively, and more directly related to Fodor's Implicit Prosody Hypothesis, one could pursue the possibility that the overwhelming preference of postnominal RCs to attach to the main NP is sourced in the prosody assigned to sentences containing such constituents. Underway is a production study eliciting utterances containing relative clauses with systematically varied length and attachment, in order to compare the prosodies projected in each case.

Acknowledgements

We are extremely grateful to Mr. Riaz Tehsin and Dr. H.K. Dewan for not only allowing us to work at different institutions of Vidya Bhawan Society in Udaipur but also for providing substantial infrastructural support. Prof. M.P. Sharma, Principal of the Institute of Advanced Study in Education, made two rooms available to us for carrying out the experiments.

Thanks are also due to Shobha Shankar and Yashpal, who helped with data collection, and to Kaushalya, Anjali, Rajni, Rajesh, and Ikram for helping with the preparation of the stimuli and with inputting the data. We also thank Andrea Vasishth for considerable assistance with stimulus preparation, checking data in-

tegrity, and logistics.

A significant portion of this research was funded in part by the Sonderforschungsbereich (Special Research Area) 378 (Resource-adaptive cognitive processes EM 6 NEGRA), at Saarland University, Germany.

References

- Brysbaert, M., & Mitchell, D. C. (1996). Modifier attachment in sentence parsing: Evidence from dutch. *Quarterly Journal of Experimental Psychology*, *49A*(3), 696–714.
- 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.
- Dayal, V. (1996). *Locality in WH Quantification: Questions and Relative Clauses in Hindi*. Dordrecht: Kluwer.
- De Vincenzi, M., & Job, R. (1993). Some observations on the universality of the late closure strategy. *Journal of Psycholinguistic Research*, *22*, 189–206.
- Fernández, E. M., Bradley, D., Igoa, J. M., & Teira, C. (2003). Prosodic phrasing in the RC-attachment ambiguity: Effects of language, RC-length, and position. In *Proceedings of the AMLaP (Architectures and Mechanisms of Language Processing) conference*. Glasgow, Scotland.

- Fernández, E. M., Bradley, D., & Taylor, D. (2005). *Prosody and informativeness in the relative clause attachment ambiguity*. (MS (submitted))
- Fodor, J. D. (2002). Psycholinguistics cannot escape prosody. In *Proceedings of the 1st International Conference on Speech Prosody* (pp. 83–88). Aix-en-Provence.
- Hemforth, B., Konieczny, L., & Scheepers, C. (1994). Principle-based and probabilistic approaches to human parsing: How universal is the human language processor. In H. Trost (Ed.), *Taugungband KONVENS 1994*. Berlin: Springer.
- Kamide, Y., & Mitchell, D. C. (1997). Relative clause attachment: Nondeterminism in Japanese Parsing. *Journal of Psycholinguistic Research*, 26(2), 247–254.
- Mitchell, D. C., Cuetos, F., & Zagar, D. (1990). Reading in different languages: Is there a universal mechanism for parsing sentences? In D. A. Balota, G. B. F. d'Arcais, & K. Rayner (Eds.), *Comprehension processes in reading*. Hillsdale, New Jersey: Erlbaum.