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On the prosodic properties of Hindi Relative Clauses

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(in prep) Prosody of high and low attachment of relative clauses in Hindi.

Outline

- Theoretical issues
- Production Experiment
- Conclusions

Theoretical considerations

- Universality of parsing strategies has been a central issue in theories of sentence processing
- Parsing preferences concerning the attachment of incoming material

Theoretical considerations

Garden-path Model (Frazier & Fodor, 1978)

Various ambiguity resolution strategies are explained by referring to a universal parsing mechanism that operates by obeying a set of structural principles.

Structures are assumed to be generated incrementally – each incoming lexical item is immediately combined with the preceding material (see Augursky 2005)

Theoretical considerations

Minimal Attachment (Frazier & Fodor, 1978), states that structures are simpler when they contain fewer syntactic nodes

- a. John IP[VP[V[knew DP[the answer] very well]].
- b. John IP[VP[V[knew CP[IP[DP[the answer VP[was wrong]]]]]]].

Late Closure (Frazier, 1987): When the number of syntactic clauses does not differ and if grammatically permissible, attach new items into the clause or phrase currently being processed (i.e. the phrase or clause postulated most recently).

- a. John IP[VP[said CP[that IP[Bill VP[died]]]] AP[yesterday]
- b. John IP[VP[said CP[that IP[Bill VP [died AP[yesterday]]]]]

Problem with late closure

(1) Someone shot the servant of the actress who was on the balcony.

a. High attachment:

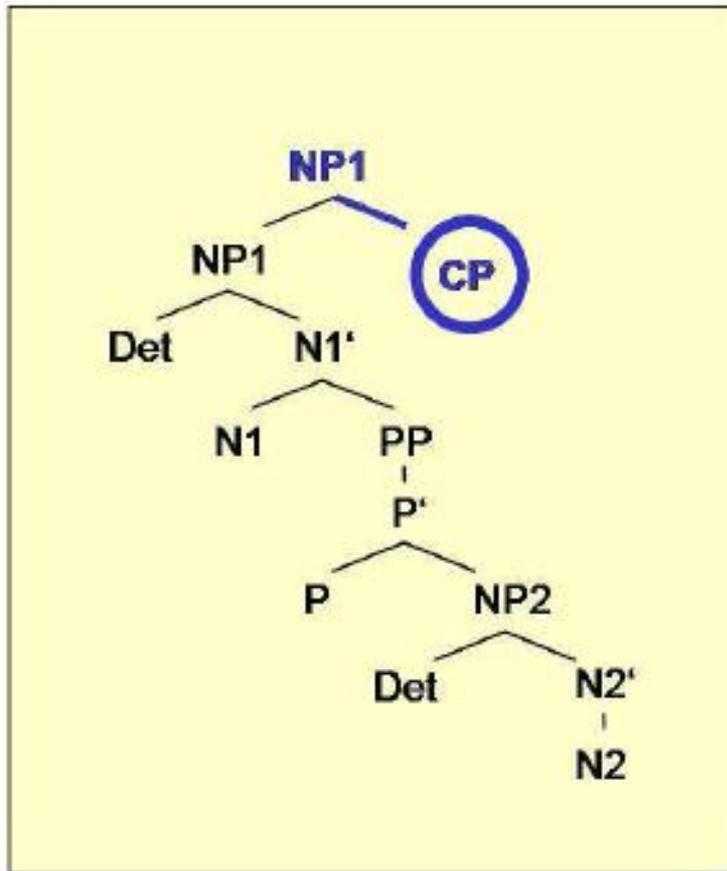
The servant was on the balcony.

b. Low attachment:

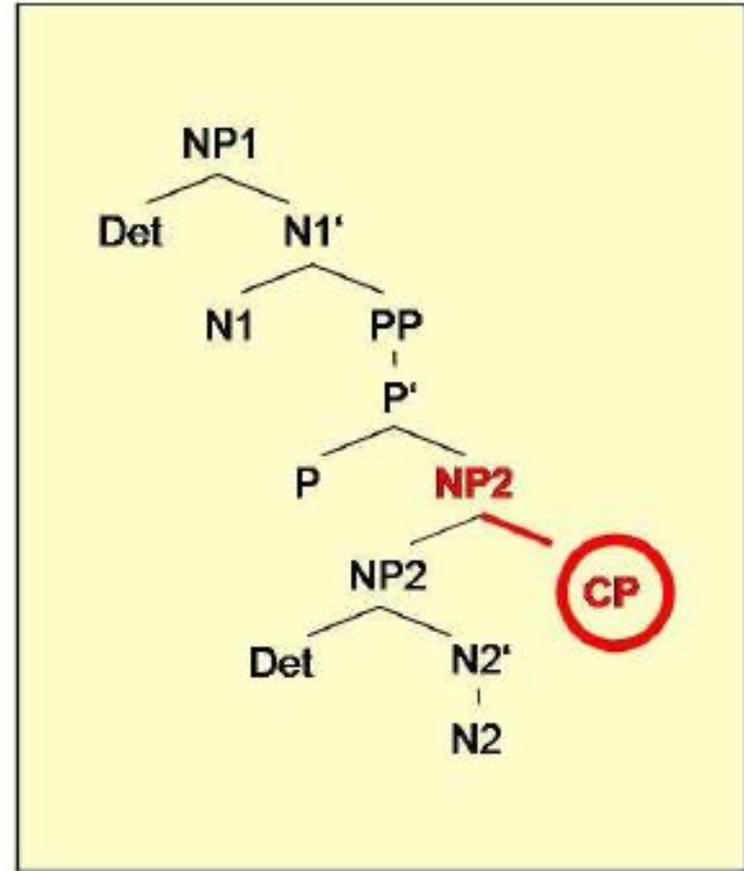
The actress was on the balcony.

Theoretical considerations

high attachment



low attachment



Problem with late closure

Someone shot the servant of the actress who was on the balcony.

- a. The servant was on the balcony.
- b. The actress was on the balcony.

Cuetos & Mitchell (1988):

Preference for (b): English (58%)

Preference for (a): Spanish (62%)

Weak percentage

Theoretical considerations

Low attachment preference:

- Arabic: Abdelghany & Fodor, 1999; Quinn, Abdelghany & Fodor, 2000
- Brazilian Portuguese: Miyamoto; 1999 (but see Finger & Zimmer, 2000; Maia & Maia, 2001 for a high-attachment advantage; Maia, Laurenço-Gomes & Moraes, 2004, for results dependent on constituent length)
- English: Cuetos & Mitchell, 1988; Mitchell & Cuetos, 1991; Gilboy, Sopena, Clifton & Frazier, 1995; Fernández, 1999, 2003; Frazier & Clifton, 1996; Henstra, 1996 (reported in Fernández, 2003) (but see Carreiras & Clifton, 1993; 1999)
- Italian: De Vincenzi & Job, 1993; 1995
- Norwegian: Ehrlich, Fernández, Fodor, Stenshoel & Vinereanu, 1999
- Romanian: Ehrlich et al., 1999
- Swedish: Ehrlich et al., 1999

Theoretical considerations

High attachment preference:

- Bulgarian: Sekerina, Petrova & Fernández, 2003
- Croatian: Lovrić & Fodor, 2000; Lovrić, 2002, 2003
- Dutch: Brysbaert & Mitchell, 1996; Frazier & Vonk, 1997; De Baecke et al., 2000; Mitchell et al., 2000; Wijnen, 1998
- French: Mitchell, Cueto & Zagar, 1990; Frenck-Mestre & Pynte, 2000b; Zagar, Pynte, Rativeau, 1997; Frenck-Mestre, 1997; Pynte & Colonna, 2000; Colonna, Pynte & Mitchell, 2000 (but see Baccino, De Vincenzi & Job, 2000)
- Galician: Fraga, García-Orza & Acuña, 2002
- German: Hemforth, Konieczny, Scheepers & Strube, 1998; Hemforth, Konieczny, Seelig & Walter, 2000; Hemforth, Konieczny & Scheepers, 2000a, 2000b; Konieczny & Hemforth, 2000 (but see Murray, Rahman & Heydel, 2000)
- Hindi: Vasishth et al., 2004; 2005
- Russian: Sekerina, 1997; 2003
- Spanish: Carreiras & Clifton, 1993, 1999; Cueto, Mitchell, Corley, 1996; Gibson, Pearlmutter & Torrens, 1999; Igoa, Carreiras & Meseguer, 1998; Thornton, MacDonald & Gil, 1999; Gilboy et al., 1995; Cueto & Mitchell, 1988; Mitchell, Cueto & Zagar, 1990
- Korean (Jun 2003, 2007)
- Japanese: Kamide & Mitchell, 1997; Miyamoto, Nakamura & Takahashi, 2003

Theoretical considerations

For short RCs (one prosodic word) there is a stronger tendency towards low (local) attachment than for mid-to-long RCs (more than one prosodic word)

(Fodor 2002)

Effect of length of the RC (Maynell 1999)

One IP:

[Someone shot the servant of the actress who cried.]

Two IPs:

[Someone shot the servant of the actress] [who cried right through the night]

Theoretical considerations

- Cuetos & Mitchell (1988) argue for language specific strategies
- Frazier and Clifton (1996) propose that different parsing strategies are applied to different types of linguistic constituents (Construal Hypothesis). For deciding the attachment site of relative clauses, it is not only syntactic information that matters, but also other linguistic factors that vary cross-linguistically

Role of prosody

Fodor (1998, 2002) argues that prosody matters for resolving attachment ambiguity, and that cross-linguistic differences in attachments preferences are due to prosodic differences across languages

‘Prosodic phrasing varies with both syntactic structure and constituent length, and it is partly universal but also subject to language-specific rules’

Theoretical considerations

Fodor's hypothesis:

- the languages which prefer high attachment are those whose interface constraints favor a prosodic break before an RC in NP1 NP2 RC

(French and Croatian have such a break, English does not)

Theoretical considerations

Jun (2007):

Korean and Japanese attach high, both have the same prosodic structure.

Jun & Koike (2008): RC NP₁ NP₂ V where high attachment is to NP₂.

Speakers realize a boundary after RC in 60-80% of the time (depending on accenting and length of the constituents).

26 out of 30 speakers prefer high attachment.

Theoretical considerations

Prosodic structure in Japanese

RC attaches to N_2

$[RC [N_1]_{NP1} N_2]_{NP2}$

$(RC) (N_1 N_2)$

RC attaches to N_1

$[[RC N_1]_{NP1} N_2]_{NP2}$

$(RC N_1 N_2)$

Theoretical considerations

Hindi is also a head-final language

abhinetrii-kii naukaraanii

actress-gen maid

(The) actress' maid.

Genitive marker belongs to NP₁

[[N₁ gen] N₂] both syntactically and prosodically

Theoretical considerations

At least three positions for the attachment of a RC:
extraposed (see below), postnominal (a) and
prenominal (b)

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

Theoretical considerations

- Prenominal RCs in Hindi are interpreted as attached to the complex NP's head: 61% for long, 53% for short
- Postnominal RCs are overwhelmingly interpreted as attached to the complex NP's head noun, regardless of RC's length, at a rate of 93%.

Vasishth, Féry, Fernandez & Shafer (in prep) Relative clause attachment ambiguity in Hindi: the role of prosody

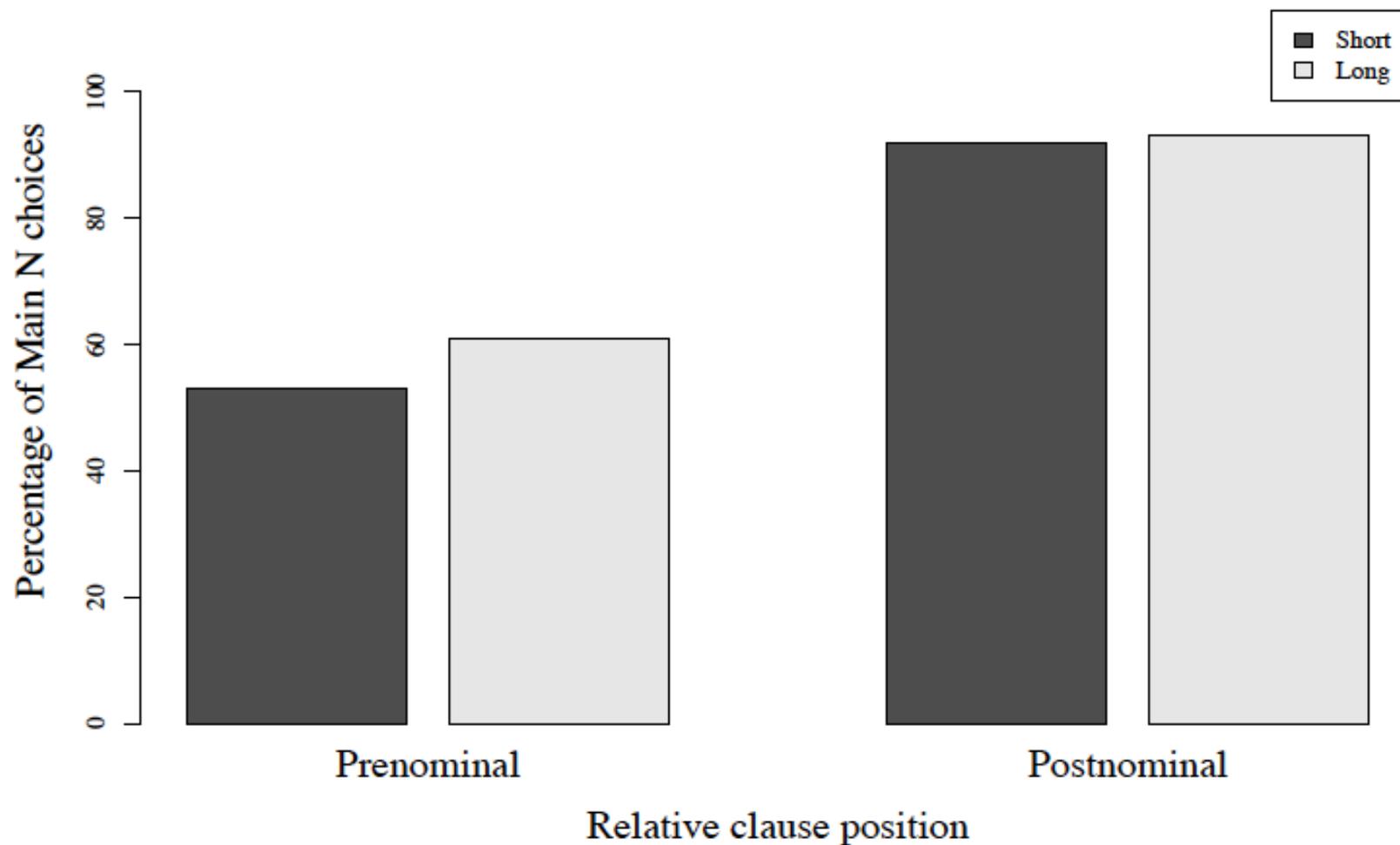


Figure 1. Percentage attachment preferences of short and long prenominal and postnominal relative clauses to the complex NP's head.

An experiment

- As already noted, Hindi RCs have a relative freedom with respect to their position in the sentence.
- We decided to investigate the prosodic properties of the following structure:
S N₁ N₂ V RC
- The reason for choosing this structure is that there is a preference for placing the RC at this position

Experiment

Question

Do differences with respect to the preferred attachment site of the relative clause result in prosodic differences?

S N₁ N₂ V RC

A note

₁ and ₂ refer to the linear order, NP₁ carries genitive case and NP₂ is the head of the complex noun, so Hindi is the reverse of English. Attach to NP₁ means low attachment, while attach to NP₂ means high attachment

Production experiment

Three kinds of object relative clauses

- Attach to N1 (low attachment)
- Attach to N2 (high attachment)
- Attach to N1 or N2 (ambiguous attachment)

A note

Participants were aware about the attachment possibilities of the relative clause. When the RC modified N1, N1 was underlined, while when the RC modified N2, N2 was underlined. There was no underline in the case of ambiguous attachment.

Pre-study

- The attachment preferences were determined by an independent paper & pencil questionnaire where the participants had to answer a forced choice question which was formed on the basis of the RC
- *eg What had the servant cleaned? i) the car ii) the key*

[conducted at JNU, New Delhi, March 2011]

Relative Clauses - Stimuli

Attach to NP1 (low attachment)

Lata-ne [**gaaRi** kii]_{NP1} caabii DhoonDi [**jo** naukar-ne saaf kii thii]_{RC}

Lata-erg car-gen key search Rel servant-erg clean

“Lata searched for the keys of the car that the servant had cleaned.”

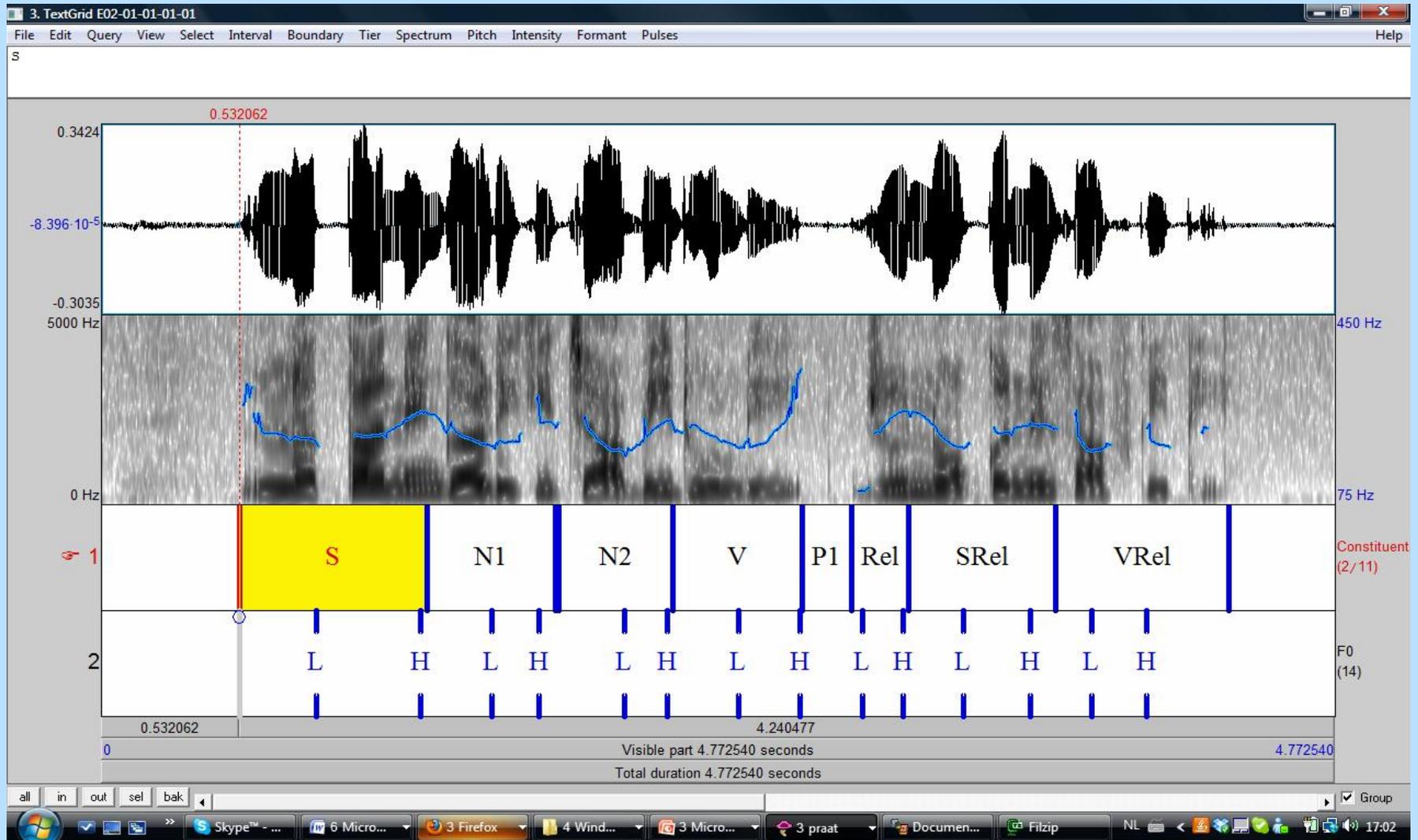
Attach to N2 (high attachment)

Lata-ne gaaRi kii [**caabii**]_{N2} DhoonDi [**jo** naukar-ne kho dii thii]_{RC}

Lata-erg car-gen key search Rel servant-erg lost

“Lata searched for the keys of the car that the servant had lost.”

Phonetic Analysis



Results

- 1008 stimuli (3 RCs × 24 instantiations × 14 speakers)
- Attachment site is reflected onto prosodic phrasing
- We will give two pieces of evidence for this:
 - (a) duration
 - (b) F0

Two different phrasings

Attach to NP₁ (low attachment)

[(Lata-ne)_P (**gaaRi kii**)_P (caabii DhoonDi)_P]_{IP} [jo naukar-ne saaf kii thii]_{IP}

Lata-erg car-gen key search Rel servant-erg clean

“Lata searched for the keys of the car that the servant had cleaned.”

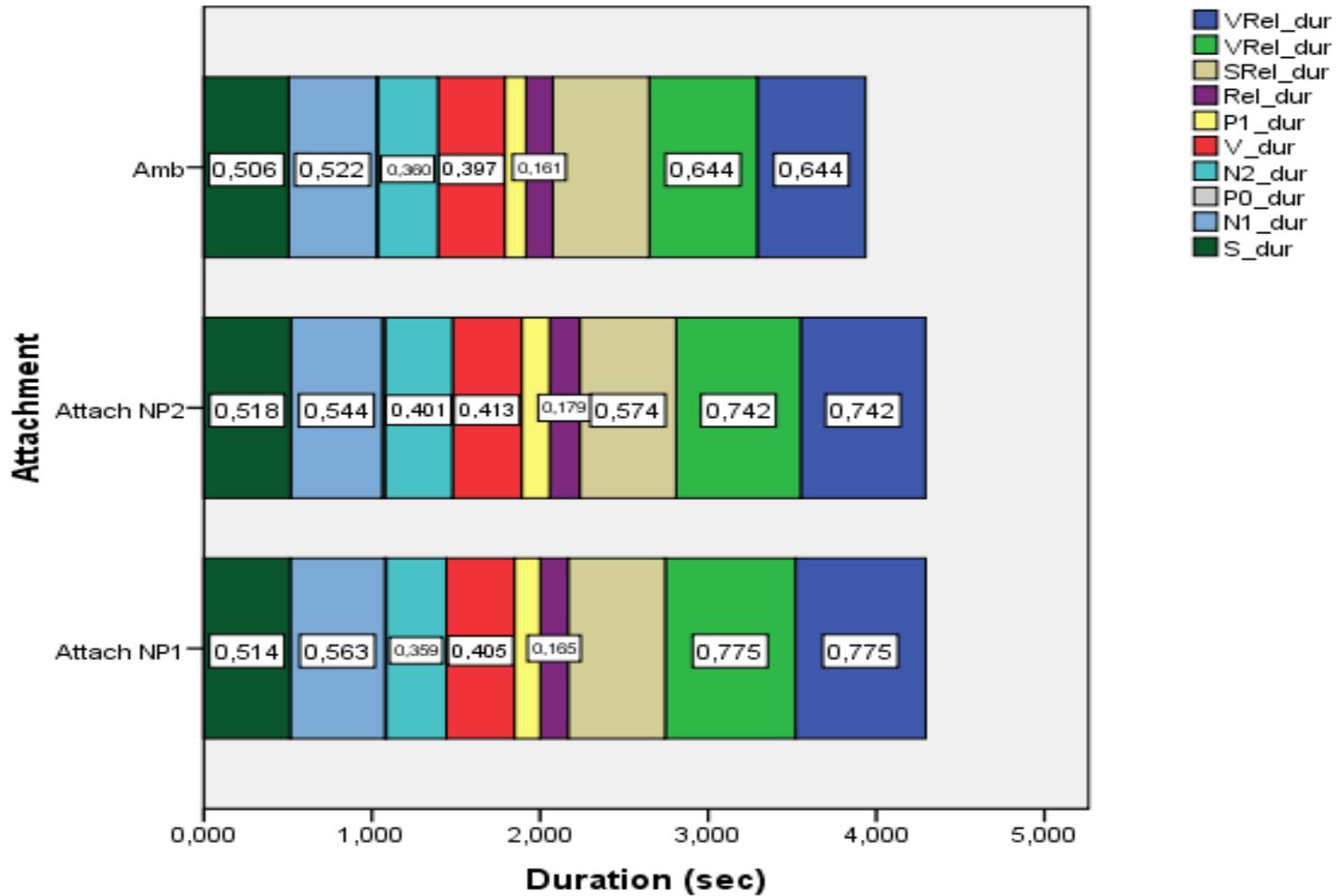
Attach to N₂ (high attachment)

[(Lata-ne)_P (gaaRi kii **caabii**)_P (DhoonDi)_P]_{IP} [jo naukar-ne kho dii thii]_{IP}

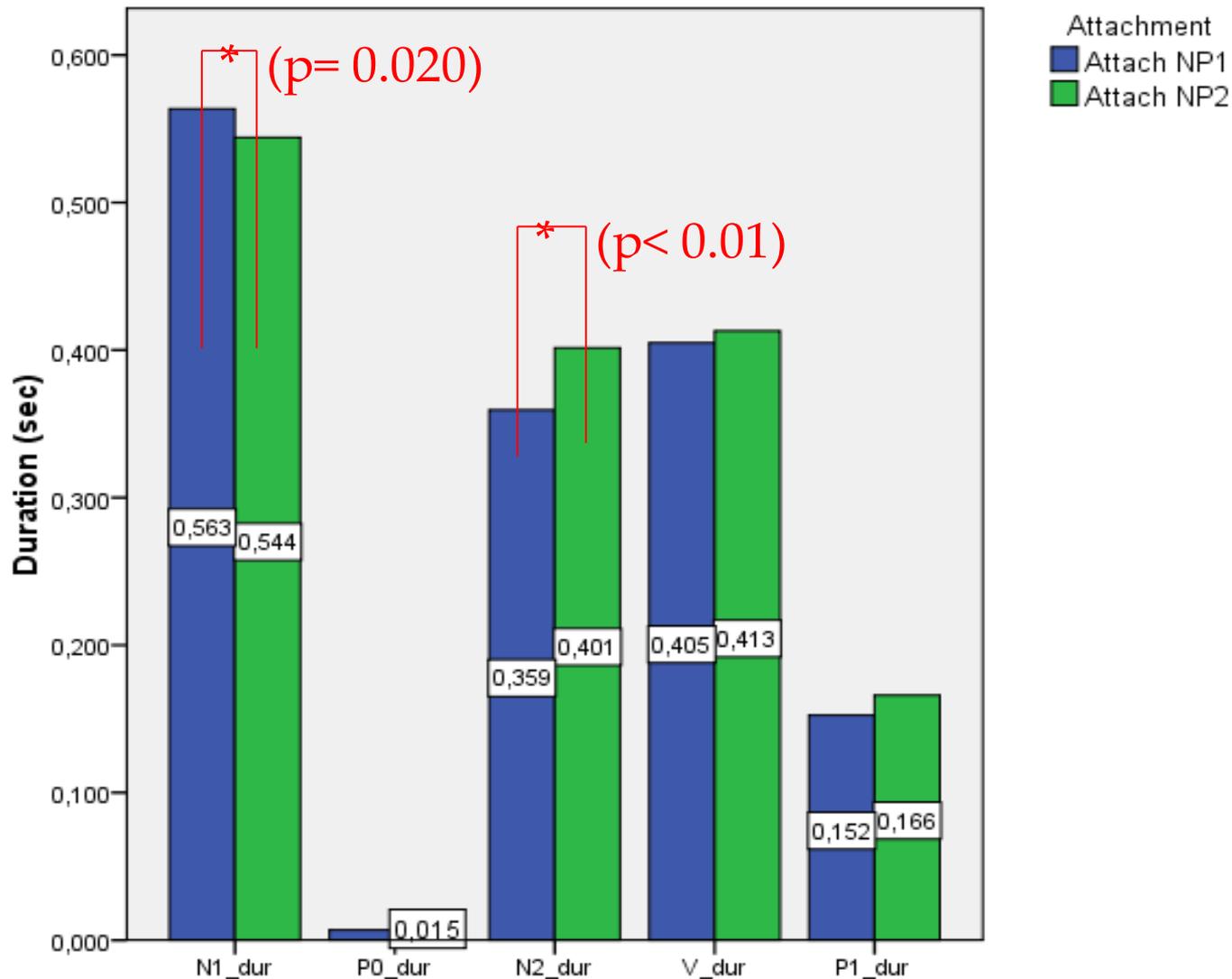
Lata-erg car-gen key search Rel servant-erg lost

“Lata searched for the keys of the car that the servant had lost.”

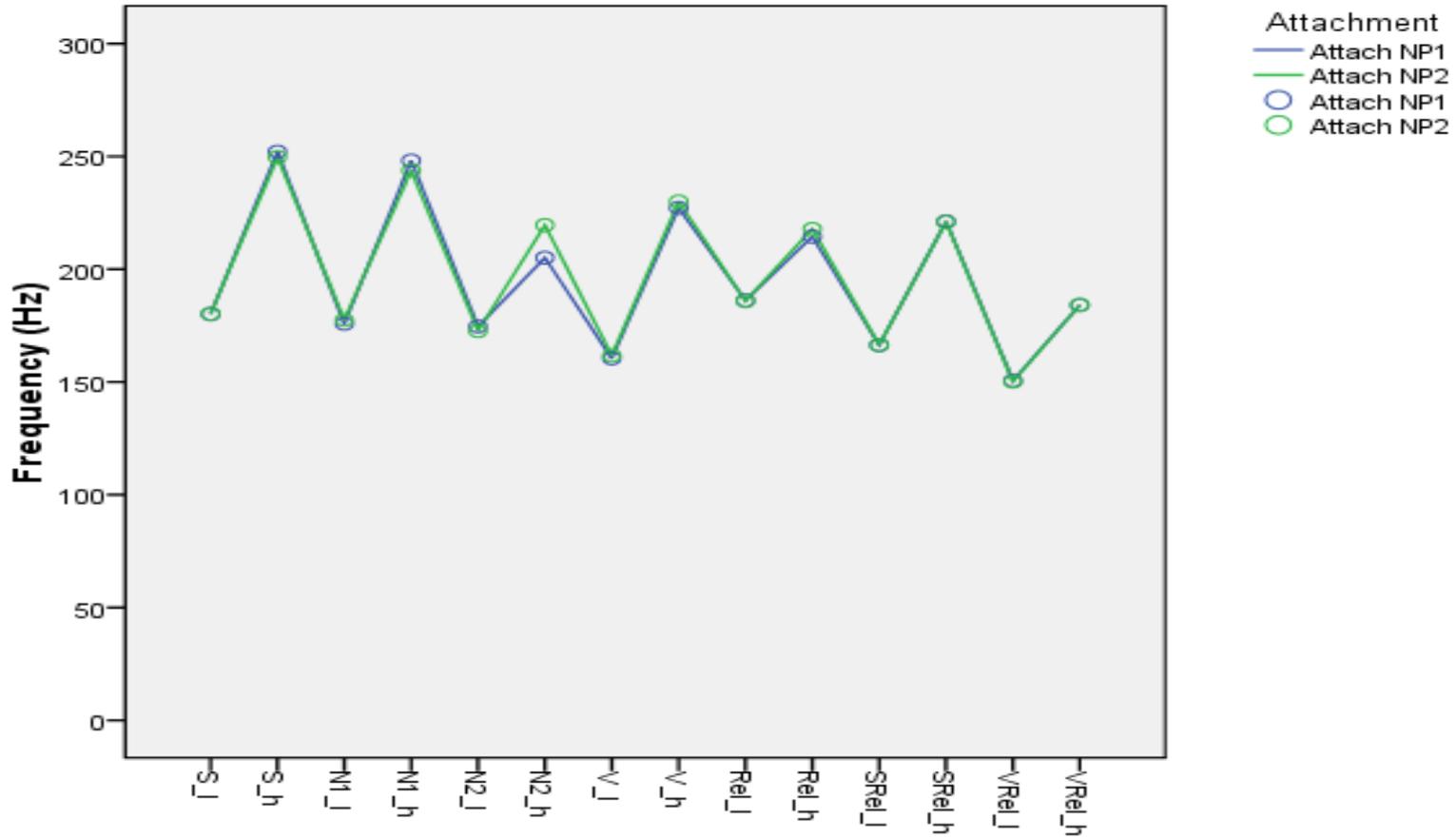
Duration

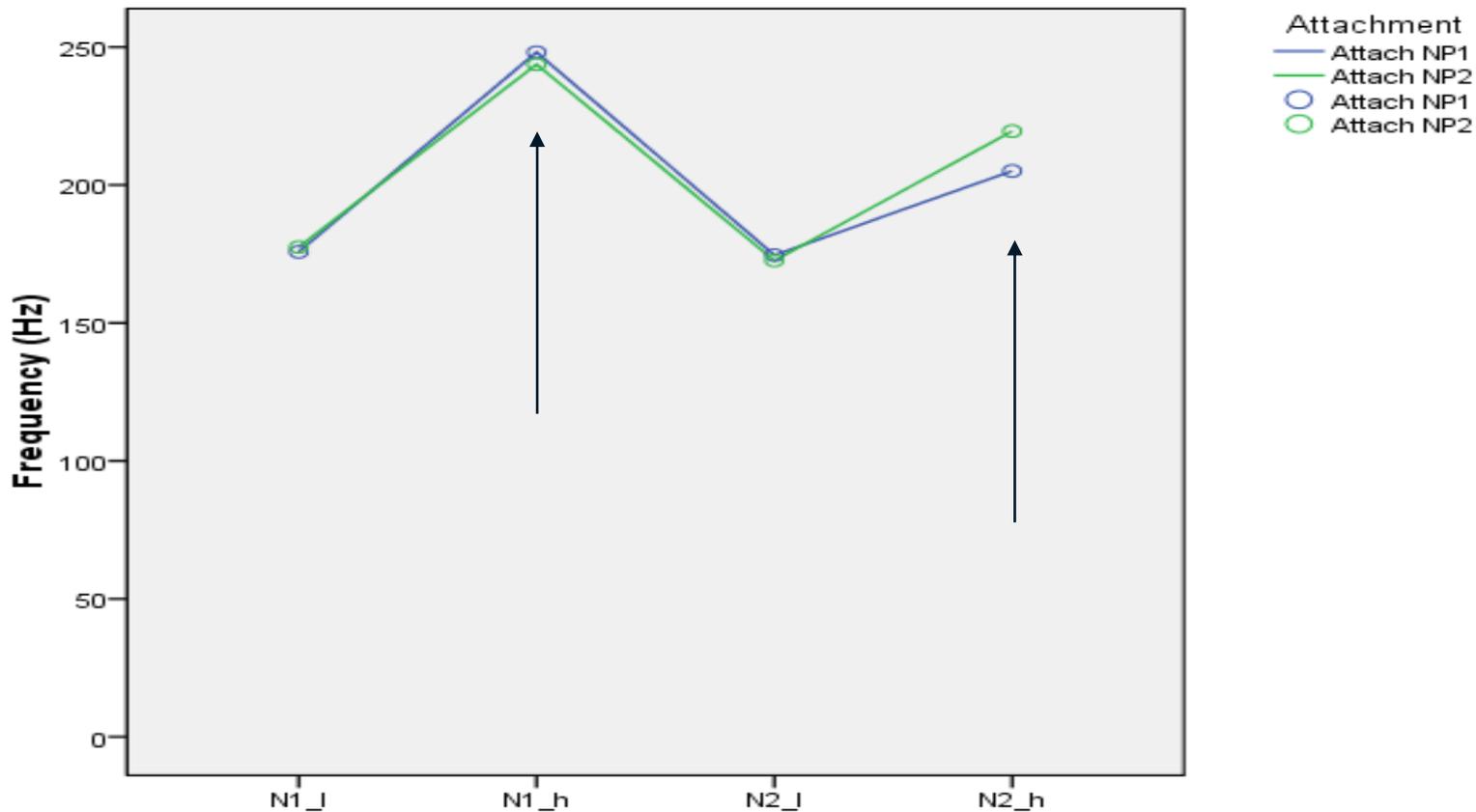


Results of Duration



Results of F0





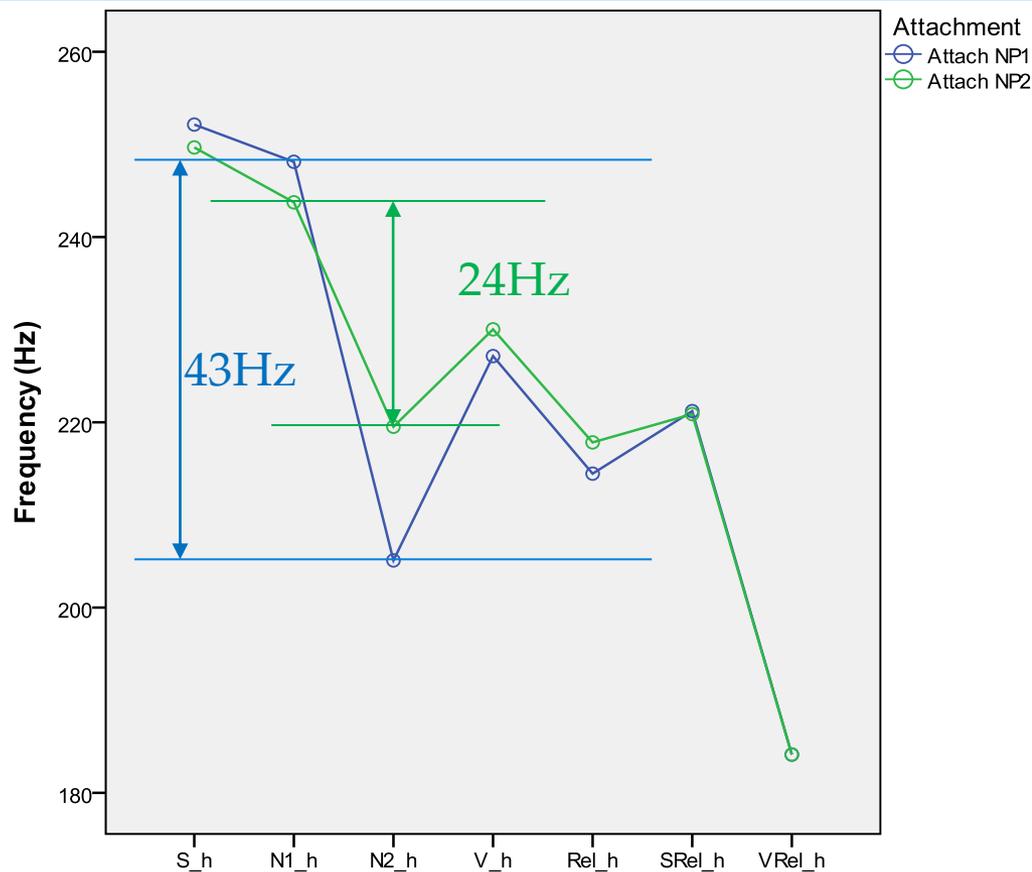
| | N1 _H | N2 _H |
|------------|-----------------|-----------------|
| Attach NP1 | 248.1 | 205.0 |

N1_H in Attach to N1 is significantly higher than N1_H in Attach to N2 ($p = 0.004$)

| | | |
|------------|-------|-------|
| Attach NP2 | 243.7 | 219.5 |
|------------|-------|-------|

N2_H in Attach to N2 is significantly higher than N2_H in Attach to N1 ($p < 0.01$)

Downstep F0



The downstep ($\Delta = N1_h - N2_h$) in Attach to N1 is significantly larger than the downstep in Attach to N2 ($p < 0.01$)

Two phrasings

Attach to NP₁ (low attachment)

[(Lata-ne)_P (**gaaRi kii**)_P (caabii DhoonDi)_P]_{IP} [jo naukara-ne saaf kii thii]_{IP}

Lata-erg car-gen key search Rel servant-erg clean

“Lata searched for the keys of the car that the servant had cleaned.”

Attach to N₂ (high attachment)

[(Lata-ne)_P (gaaRi kii **caabii**)_P (DhoonDi)_P]_{IP} [jo naukara-ne kho dii thii]_{IP}

Lata-erg car-gen key search Rel servant-erg lost

“Lata searched for the keys of the car that the servant had lost.”

Conclusions

The RC forms its own IP. We assume that this is related to its postverbal position.

$[[N_1\text{-gen}]_{NP1} N_2]_{NP2} V [RC]$

RC attaches to N_1 (low attachment)
(S) (N_1) ($N_2 V$) (RC)

RC attaches to N_2 (high attachment)
(S) ($N_1 N_2$) (V) (RC)

Conclusions

Attach to N1 (low attachment)

(RC N1 N2) (V)

[Japanese]

Attach to N1 (low attachment)

(N1) (N2 V) (RC)

[Hindi]

Attach to N2 (high attachment)

(RC) (N1 N2) (V)

[Japanese]

Attach to N2 (high attachment)

(N1 N2) (V) (RC)

[Hindi]

Thank you for listening!