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## Clauses and the prosody of the right edge in Hindi-Urdu

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### 1 Introduction

The post-verbal positioning of complement clauses in otherwise verb-final Hindi-Urdu has served as provocation for an impressive body of research in Indic syntax.

(1) a. Sita-ne kahaa thaa [<sub>CP</sub> ki Mohan aayaa thaa] [<sub>Subj</sub> V Aux CP]

Sita-erg said AUX that Mohan come AUX

‘Sita said that Mohan had come.’

b. \*Sita-ne [<sub>CP</sub> ki Mohan aayaa thaa] kahaa thaa \*[<sub>Subj</sub> CP V Aux]

A range of syntactic proposals emerged, positing base-generation or rightward adjunction in the narrow syntax (e.g. Dayal 1996, Lahiri 2002, Bhatt and Dayal 2007). This paper furthers an argument that Hindi-Urdu clauses are linearized postverbally in the phonological component, contributing both to recent work on the prosody of the right edge (e.g. Bennett, Elfner, and McCloskey 2014), as well the wider research program investigating the systematic mapping of clauses to prosodic constituents crosslinguistically (Kawahara and Shinya 2008, Selkirk 2011, Henderson 2012).

In previous work Manetta (2012) claimed that postverbal complement clauses in Hindi-Urdu are aligned to the right edge in the phonological component. This appears to account for important differences in the characteristics of postverbal DPs and CPs: unlike postverbal DPs, postverbal CPs have no correlation with marked information structure, and they must appear to the right of any auxiliaries and postverbal DPs. Despite this progress, a puzzle remains.

### 2 The puzzle

Relative clauses may appear adjacent to the head they modify, or they may appear extraposed to the right edge of their containing clause. But, verbal complement clauses (VCPs) and relative clauses (RCs) are not freely ordered in the postverbal field. The VCP must be rightmost.

(2) a. Raam-ne us aadmii-ko kahaa [jo aayaa thaa] [ki siitaa gayii] S-IO-V-RC-CP

Raam-ERG that man-DAT said [REL came AUX] [that Sita left]

‘Ram told that man who had come that Sita had left.’

b. \*Raam-ne us aadmii-ko kahaa [ki siitaa gayii][jo aayaa thaa] \*S-IO-V-CP-RC

These facts do not fall out from any syntactic approach, nor can they be explained by the alignment approach found in Manetta 2012.

### 3 The proposal

In this paper I propose that the RC-VCP ordering arises due to prosodic factors, and recharacterize the original ALIGN approach within Match Theory (Selkirk 2011). The intuition that I will pursue is that because the language requires an obligatory downstep pattern within an intonational phrase (ιP) (Patil et al 2008), prosodically embedded ιPs are dispreferred because the initial pitch reset on the ιP cannot be realized (Gryllia et al, Féry 2010). VCPs will obligatorily shift rightward, but RCs are further limited by a MATCH constraint punishing shift out of their containing DP, resulting in apparent optionality in rightward displacement. A constraint punishing relative changes in linear order between syntactic terminal nodes and phonological form will force the RC to precede the VCP, since it cannot shift further than necessary from its syntactic base position.

The core intuition here is, as in Vasishth et al 2005, “...major syntactic discontinuity coincides with major prosodic discontinuity”.

#### 4 Experimental Work

A growing body of experimental work has focused on prosodic phrasing of RCs in Hindi-Urdu. Center embedding is dispreferred, hypothetically due to the regular downstep of all prosodic parts; unlike in German, listeners are provided with no prosodic structure to match the syntactic center embedding (Kidwai 2000, Féry and Vasishth 2009). Extraposed RCs are independent intonational phrases with left edge boundaries realized with a pitch rise on the verb, pause between the verb and RC, and pitch reset following the verb (Gryllia et al 2011, Patil et al 2008). In a context in which there are multiple potential associate DPs the prosodic nature of the V-RC boundary disambiguates.

The present paper serves as a call for (at least) three kinds of experimental work on Hindi-Urdu and related languages:

- (a) What is the prosodic contour associated with VCPs? In particular, what is the nature of the verb-VCP boundary and what is the relative height of the  $\iota$ P-initial pitch-reset?
- (b) Is there a substantive prosodic pattern that can distinguish Indic languages that permit VCPs in situ (e.g. Bangla) from those that require them to appear extraposed? Perhaps a greater tolerance for violation of the downstep (as in German – see Féry and Schubö 2010)?
- (c) What does the prosodic realization of postverbal DPs look like and what is the nature of the boundary between a postverbal DP and the following VCP?

#### 5 The account

DOWNSTEP >> REALIZE ( $\wedge$ ,  $\iota$ P), MATCH-PHRASE (DP,  $\varphi$ ) >> NO SHIFT, STRONG START

- (3) DOWNSTEP: Realize a downstep over  $\iota$ P (Within an  $\iota$ -phrase the H tone on each  $\varphi$ -phrase must have a pitch peak lower than the preceding pitch peak) (see Kügler 2008)
- (4) REALIZE ( $\wedge$ ,  $\iota$ P) Realize a pitch reset at the beginning of each  $\iota$ -phrase (see Selkirk 2006, Kügler 2008)
- (5) MATCH-PHRASE: Suppose there is a syntactic phrase (XP) in the syntactic representation that exhaustively dominates a set of one or more terminal nodes  $\alpha$ . Assign one violation mark if there is no phonological phrase ( $\phi$ ) in the phonological representation that exhaustively dominates all and only the phonological exponents of the terminal nodes in  $\alpha$  (reformulation of Selkirk 2011 as in Elfner 2012).
- (6) NO SHIFT Assign a violation mark for each instance in which a terminal element  $\alpha$  is linearly ordered before a terminal element  $\beta$  in the syntactic representation of an expression  $E$ , but the phonological exponent of  $\alpha$  does not precede the phonological exponent of  $\beta$  in the phonological representation of  $E$  (based on Elfner 2012 but reminiscent of linearization in the sense of Fox and Pesetsky 2004).
- (7) STRONG START: assign one violation mark for every prosodic constituent whose leftmost daughter constituent is lower in the Prosodic Hierarchy than its sister constituent immediately to its right:  $*(\kappa_n \kappa_{n+1} \dots)$  (after Selkirk 2011)

DP-RC CP V	DOWNSTEP	REALIZE ( $\wedge$ , $\iota$ P)	MATCH-PHRASE (DP, $\varphi$ )	NO SHIFT	STRONG START
a. DP-RC CP V		**!			*
b. $\curvearrowright$ DP-RC V CP		*		*	*
c. $\curvearrowright$ DP V RC CP			*	**	
d. DP V CP RC			*	***!	

What this ranking says about Hindi-Urdu:

The grammar permits re-linearization of all embedded clauses in order to allow the initial pitch reset to be realized, but is less amenable to reordering of constituents from within a DP, creating optionality with respect to the reordering of RCs (though see Vasishth et al 2004 on what might condition that optionality).

## 6 Conclusion

This approach to the prosodic structure of Hindi-Urdu clauses and to the right edge not only supports the view that DPs and CPs arrive at the right edge via distinct mechanisms (and indeed in distinct components of the grammar), but provides some explanation as to why Hindi-Urdu preferentially extraposes embedded clauses. It further provides new understanding of the optionality of extraposition for RCs and the obligatory RC-VCP ordering.

More broadly, this line of inquiry continues to push forward our understanding of the role of the right edge of the clause in both the syntactic and prosodic domains.

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