An approach to the apparent polysemy of the Hindi (scalar-)additive particle *bhī*

WCCFL 39

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1. Hindi *bhī*

- Hindi *bhī* (along with similar particles throughout South Asian languages) appears to be ambiguous between a plain additive and a scalar-additive reading.
  - (1) rām partī meṁ āyā.   shyām bhī āyā.
        Ram party in   came. Shyam *bhī* came.
        "Ram came to the party. Shyam came too." **[plain additive]**
  - (2) shyām bhī āyā! vah kabhī   partī meṁ nahīṁ ātā.
        Shyam *bhī* came! he anytime party in   not   comes.
        "Even Shyam came! He never comes to parties."
        [scalar-additive]
- Is *bhī* really ambiguous?
- Are there two *bhī*s? Or not?

2. Additional pieces?

- Initial evidence of acoustic correlates of the 2 *bhī*-interpretations in differences in the realisation of the F0 excursion/L*H pitch accent, particularly the word-final F0 contour.
- Which raises the possibility that the scalar component, when it appears, derives not from *bhī*, but from something else (maybe realised as a prosodic element).
- Avoiding positing two *bhī*s or an element that makes *bhī*'s contribution redundant requires a compositional approach that augments the properties of the existentially-bound variable of the presupposition.

3. Hindi "evens": *bhī*, *tak*

- Hindi *tak* as a scalar requires the focus constituent to be the lowest element on the relevant scale, but does not require a salient alternative [cf. Schwenter & Vasishth (2000)]
- while Hindi *bhī* is seemingly ambiguous between a plain additive reading and a (non-exhaustive) scalar-additive reading [cf. Lahiri (1998), Schwenter & Vasishth (2000)]

	Exhaustive	Additive	Scalar
tak	YES	NO	YES
bhī	NO	YES	SOMETIMES

4. Differences between *tak* and the 2 *bhī* readings

- (3) "This time, the exam was very difficult…"
  - a. …klās kī sabse hośiyār chātrā fel ho gayī, aur maiṁ **bhī** / #**tak** fel ho gayā.
        class of most bright student failed,   and I   *bbī* / #*tak* failed.
        "…the class's brightest student failed, and [I]^F also failed." **[plain additive]**
  - b. …klās kī sabse hośiyār chātrā **bhī** / **tak** fel ho gayī.
        class of most bright student failed *bbī* / *tak* failed.
        "…even [the class's brightest student]^F failed." **[scalar-additive]**
- (4) "Who ate the goat's eyes?" [adapted from Schwenter & Vasishth 2000]
  - a. B: meri dādī -**tak**-ne / #-ne-**bhī** khāyīṁ.
        B: my granny -*tak*-ERG / #-ERG-*bbī* ate.
        "[My granny]^F (the least likely person of all) ate it."
  - b. B': mai-ne khāyīṁ aur meri dādī -**tak**-ne / -ne-**bhī** / -**tak**-ne-**bhī**
        B': I-ERG ate   and my granny -*tak*-ERG / -ERG-*bbī* / -*tak*-ERG-*bbī*
        khāyīṁ.
        ate.
        "I ate it and even [my granny]^F ate it."

5. Proposed denotations

Assuming an alternative semantics of focus (Rooth 1985), *bhī* is a particle that combines with an element x and a (potentially partially-saturated) predicate P, asserts that $P(x)$, and presupposes that there exists some alternative element x^* s.t. $R(x^*)$ is true for some focus alternative to $P(x)$:

$[\![bhī_{additive}]\!] =$
- (5) $\lambda x \lambda P : \exists x^* \exists R[x \neq x^* \& R(x^*) \in FA(P(x))].P(x)$

The scalar-additive interpretation associated w/ *bhī* requires that in addition to the existence of another salient alternative, that alternative must be less unexpected (=higher-ranked on a likeliness scale S):

$[\![bhī_{scalar-additive}]\!] =$
- (6) $\lambda S \lambda x_S \lambda P : \exists x_S^* \exists R[x \neq x^* \& R(x_S^*) \in FA(P(x_S)) \& x_S < x_S^*].P(x_S)$

And scalar *tak* can be distinguished from scalar-additive *bhī* by defining it as:

$[\![tak]\!] =$
- (7) $\lambda S \lambda x_S \lambda P : \forall x_S^* \exists R[R(x_S^*) \in FA(P(x_S)) \& x_S < x_S^*].P(x_S)$

6. Basque phonetic differences between additive & scalar-additive interpretations

- Etxeberria & Irurtzun (2015) report a similar situation for Basque *ere*, seemingly ambiguous between simple additive & scalar additive readings
- (8) Jon ere etorri da.
      Jon *ere* come AUX
   "Jon came too / Even Jon came."   [Basque]

Basque prosodic differences for elements associated with *ere*
Etxeberria & Irurtzun (2015) report significant differences for both duration and F0 measurements, with high F0 and intensity of the focussed element in Scalar conditions

7. Hindi focus prosody pilot study

- Both Lahiri (1998) (for Hindi) & Etxeberria & Irurtzun (2015) (for Basque) suggest that the scalar meaning component might be separate from the particle, contributed in some way by focus
- Previous studies of Hindi prosody (Khan 2016) & focus-related prosody (Patil et al. 2008; Féry 2010; Puri 2013; Kügler 2020)
- IO offer the best environment for observing acoustic correlates of focus (Kügler 2020)
- 2 native Hindi-speaking subjects read 20 target sentences (10 plain additive; 10 scalar-additive) along with background information (context)
- All target sentences of the form:
  Subj | IO **bhī** | DO | Verb

8. Test data sample

- (9) a. सबीन ने बलदेव और सुनीता को घड़ी दी । सबीन ने नीरा को भी घड़ी दी ।
      b. Sabīn ne baldev aur sunītā ko gharī dī. Sabīn ne
          Sabeen ERG Baldev and Suneeta DAT watch gave. Sabin ERG
          nīra ko bhī gharī dī
          Neera DAT *bbī* watch gave.
          "Sabeen gave a watch to Baldev and Suneeta. Sabeen gave NEERA a watch too." **[plain additive]**
- (10) a. सब जानते हैं कि नीरा कभी घड़ी नहीं पहनती । सबीन ने नीरा को भी घड़ी दी ।
       b. sab jānte haiṁ ki nīrā kabhī ghaḍī nahīṁ pahntī.
          all know are that Neera anytime watch not   wears.
          Sabīn ne nīra ko bhī gharī dī.
          Sabeen ERG Neera DAT *bbī* watch gave.
          "Everyone knows Neera never wears a watch. Sabeen even gave a watch to NEERA." **[scalar-additive]**

9. Results of the pilot prosody study

- Post focal pitch compression for both speakers (an indicator of focus in Hindi, cf. Patil et al. 2008; Kügler 2020).
- Statistically significant difference (Speaker 1: $p = .02$, Speaker 2: $p = .05$) in F0 excursion between additive and scalar for both speakers in the focused constituent
- In both cases the additive mean excursion is larger than that of the scalar

F0 excursion - Speaker1 -additive v. scalar

F0 excursion - Speaker2 - additive v. scalar
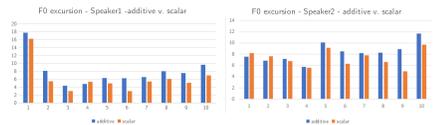
10. Praat spectrograms example
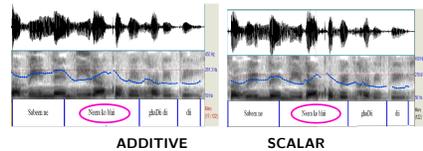
ADDITIVE   **SCALAR**

11. Continuised *bhī*

- In order to derive the scalar-additive interpretation of *bhī* from the plain additive interpretation + a contribution of a prosodic "scalaring" element, need the variables ranked on a scale in the meaning of the prosodic component to be able to get captured by operators ($\lambda, \exists$) in the definition of *bhī*. Adopt a continuation semantics approach (Barker 2002; Shan 2005; cf. Strachey & Wadsworth 1974)
- Implement by wrapping the initial definition in a continuation function (k), producing a continuised version of (5), delaying the evaluation of the arguments associated with the propositional alternatives; this serves as a single base definition for *bhī*:

$[\![bhī_{(continuised)}]\!] =$
$\lambda k \lambda x \lambda P : \exists x^*[k(\lambda y \lambda z.R(z) \in FA(P(y)))(x)(x^*)].P(x)$

12. Definition of prosodic element

The prosodic component too utilises a function on its continuation ($=\lambda j$, with which the inner part of the denotation of *bhī* will be composed):

$[\![SCALAR\ PROSODIC\ ELEMENT]\!] =$
$\lambda S \lambda j \lambda u \lambda w.[j(u)(w) \& u, w \in S \& u < w]$

This allows for single definition of *bhī*, which can compose with the prosodic element (itself composed with a salient scale S) to produce the scalar-additive reading:

$[\![bhī]\!] ([\![SCALAR\ PROSODIC\ ELEMENT]\!]) =$
$[\lambda k \lambda x \lambda P : \exists x^*[k(\lambda y \lambda z.R(z) \in FA(P(y)))(x)(x^*)].P(x)]$
$\quad (\lambda j \lambda u \lambda w[j(u)(w) \& u < w]) =$
$\lambda x \lambda P : \exists x^*[\lambda j \lambda u \lambda w.[j(u)(w) \& u < w](\lambda y \lambda z.R(z) \in FA(P(y)))(x)(x^*)].P(x) =$
$\lambda x \lambda P : \exists x^*[\lambda u \lambda w[\lambda y \lambda z.R(z) \in FA(P(y))(u)(w) \& u < w](x)(x^*)].P(x) =$
$\lambda x \lambda P : \exists x^*[\lambda u \lambda w[R(w) \in FA(P(u)) \& u < w](x)(x^*)].P(x) =$
$\lambda x \lambda P : \exists x^*[R(x^*) \in FA(P(x)) \& x < x^*].P(x)$

13. Deriving plain additive *bhī*

In the case of there being no scalar prosodic element in the environment for *bhī* to combine with, the LOWER operation can instead apply, saturating the continuation argument (k) with the identity function:

$LOWER([\![bhī]\!]) =$
$\lambda k \lambda x \lambda P : \exists x^*[k(\lambda y \lambda z.R(z) \in FA(P(y)))(x)(x^*)].P(x)id =$
$\lambda k \lambda x \lambda P : \exists x^*[id(\lambda y \lambda z.R(z) \in FA(P(y))(x)(x^*)].P(x) =$
$\lambda x \lambda P : \exists x^*[\lambda y \lambda z.R(z) \in FA(P(y))(x)(x^*)].P(x) =$
$\lambda x \lambda P : \exists x^*[R(x^*) \in FA(P(x))].P(x)$

14. Scalarisation in Hindi *hī*, *to*

Perhaps also for Hindi *hī* (Bajaj 2016), which has a scalar component that manifests in various configurations, and *to* (Montaut 2016 and others), which also seems to associate with a variety of functions, including a variety of contrastive/intensive, as well as temporal "conjunction", the latter of which is arguably scalar in nature.

15. Distributed "even" elsewhere

While it does not involve an apparent prosodic component to "scalarise" the additive like Hindi or Basque, the Hungarian scalar-additive "even" also involves two clearly separate components (*még…is*):
- (11) Jon zsiros-kenyeret kért. Feri **is** zsiros-kenyeret kért.
       Jon.NOM lard.ADJ-bread.ACC asked. Feri.NOM **too** lard.ADJ-bread.ACC asked
       "Jon asked for some bread with lard. Feri **also** asked for some bread with lard." **[plain additive]**
- (12) Mindenki zsiros-kenyeret kért. **Még** Feri **is** zsiros-kenyeret
       everyone.NOM lard.ADJ-bread.ACC asked. **still** Feri.NOM **too** lard.ADJ-bread.ACC
       kért.
       asked
       "Everyone asked for some bread with lard. **Even** Feri asked for some bread with lard." **[scalar-additive]**

Similarities to elements like *already*, *still*, *anymore*; Hungarian *mégis*; Hindi *phir* (*bhī*) (both as concessive "still") which involve focus and some presupposition, generally scalar, cf. Csirmaz & Slade (2020).

16. References

Bajaj, Vandana. 2016. *Scaling up exclusive -hii*. New Brunswick, NJ: Rutgers University dissertation.

Barker, Chris. 2002. Continuations and the nature of quantification. *Natural Language Semantics* 10. 211–242.

Csirmaz, Aniko & Benjamin Slade. 2020. Anatomy of Hungarian aspectual particles. In Veronika Hegedűs & Irene Vogel (eds.), *Approaches to Hungarian: Papers from the 2017 Budapest Conference*, 26–45. Amsterdam: John Benjamins.

Etxeberria, Urtzi & Aritz Irurtzun. 2015. The emergence of scalar meanings. *Frontiers in Psychology* 6. doi:10.3389/fpsyg.2015.00141.

Féry, Caroline. 2010. Indian languages as intonation 'phrase languages'. In S. Imtiaz Hasnain & Shreesh Chaudhary (eds.), *Problematizing language studies: Festschrift for Rama Agnihotri*, 288–312. Delhi: Aakar Books.

Khan, Sameer ud Dowla. 2016. The intonation of South Asian languages: Towards a comparative analysis. In Mythili Menon & Saurov Syed (eds.), *Proceedings of FASAL 6*, 23–26.

Kügler, Frank. 2020. Post-focal compression as a prosodic cue for focus perception in Hindi. *Journal of South Asian Linguistics* 10(2). 38–59.

Lahiri, Utpal. 1998. Focus and Negative Polarity in Hindi. *Natural Language Semantics* 6. 57–123.

Montaut, Annie. 2016. The discourse particle *to* and word ordering in Hindi: From grammar to discourse. In M.M. Jocelyne Fernandez-Vest & Robert D. Van Valin (eds.), *Information Structuring in Spoken Languages from a Cross-linguistic Perspective*, 263–284. Berlin: De Gruyter Mouton.

Patil, Umesh, Gerrit Kentner, Anja Gollrad, Frank Kügler, Caroline Féry & Shravan Vasishth. 2008. Focus, word order and intonation in Hindi. *Journal of South Asian Linguistics* 1(1). 53–67.

Puri, Vandana. 2013. *Intonation in Indian English and Hindi late and simultaneous bilinguals*. Urbana: University of Illinois dissertation.

Rooth, Mats. 1985. *Association with focus*. Amherst: University of Massachusetts dissertation.

Schwenter, Scott A. & Shravan Vasishth. 2000. Absolute and relative salience particles in Spanish and Hindi. *Annual Meeting of the Berkeley Linguistics Society* 26(1). 225–233. doi:10.3765/bls.v26i1.1124.

Shan, Chung-chieh. 2005. *Linguistic side effects*. Cambridge, Mass: Harvard University dissertation.

Strachey, Christopher & Christopher Wadsworth. 1974. Continuations: A mathematical semantics for handling full jumps. Tech. Rep. PRG-11. Oxford University, Computing Laboratory.