THE INTONATION OF SOUTH ASIAN LANGUAGES
TOWARDS A COMPARATIVE ANALYSIS

SAMEER UD DOWLA KHAN, REED COLLEGE
FASAL-6, UMASS AMHERST
12 MARCH 2016
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South Asia has long been identified as a region of convergence, i.e. a “linguistic area” (Emeneau 1956).

“Typical” South Asian lgs (SALs) have:
- Retroflexion
- Echo reduplication
- No inflectional prefixes
- SOV order
- Non-nominative experiencer subjects
- Vector verbs
The **more lgs** we examine, of course, the more **nuanced** and **typological** these claims become (Subbārāo 2012)

- No retroflexion in Asm, most Tibeto-Burman lgs
- Inflectional prefixes common in Khasic lgs
- Experiencer subjects (in e.g. ‘Ram is hungry’) take:
  - DAT in Dravidian lgs, Munda lgs, most Indic lgs
  - GEN in Assamese, Bengali, Oriya, Kokborok, Bodo
  - NOM in Khasi, Meithei Manipuri
**Question**: Is there also a *typical intonation* for SALs?

*Little comparative work* in this area
- cf. Romance lgs (Frota & Prieto 2015)

What has been done suggests SALs from different regions and families do have *strikingly similar intonation* (Féry 2010)
GOALS FOR THIS TALK

- Review current work from various researchers, and share findings from my ongoing **comparative work** (Khan 2016)

- Present intonational **properties shared** across SALs

- Highlight **major areas of variation** within and across lgs

- Identify **gaps in our knowledge** of SALs

- Encourage **collaboration** within and across lgs, subfields
Findings presented come from recent work by many researchers working on Asm, Bng, Hnd, Pnj, Tml, etc.

I also introduce comparative work in progress (Khan 2016), based on recordings of:

- North Wind and Sun fable from 7 SALs with JIPA illustrations: Asm, Bng, Hnd, Npl, Snd, Tlg, Tml
- 2 SALs in Prosodic Typology II (Jun 2014): Bng, Tml

For crosslinguistic transparency, examples are transcribed using adaptations of B-ToBI (Khan 2008/2014)

- Informed by various lg-specific work
- Important lg-specific adaptations to be discussed
Intonation has been studied in SALs for at least a century. Until 25 yrs ago, almost exclusively impressionistic work. Example: early work on Gujarati (Firth 1957).

Ahmedabad is the centre for the mills (unemphatic)
INTONATION

- **Obvious drawbacks**
  - Pitch is hard to transcribe
  - Can convince yourself of a lot...
  - Produced by just one speaker (often the author)
  - Deliberately produced
  - Variation below level of consciousness likely to be missed

- So what? That was a long time ago
- For almost all SALs, impressionistic observations are still **all we have** in terms of intonational description
Since 1980s, **developments** in two areas have dramatically changed how we study intonation

- **Technical:**
  - Recording, esp. in the digital age
  - Analysis, esp. with phonetic software

- **Theoretical:**
  - Autosegmental phonology (Goldsmith 1976, Selkirk 1984)
  - Metrical phonology (Hayes 1981)
  - Autosegmental-Metrical (AM) theory (Pierrehumbert 1980, see Ladd 1996)
Constraints: intonational tones are classified in two ways

- **Target**: relative level of pitch
  - Low (L)
  - High (H)
  - Combinations of the two, e.g. L+H, LH

- **Type**: structure to which it is associated/attracted
  - Pitch accent (T*): marks prominence (see next slide)
  - Boundary tone (T%, T−, Ta, Tl, Tp): marks edges of prosodic units
Prominence: privileged phonological status
Can be marked phonetically with:
- **Stress** ("stress accent"): psycho-acoustic feature
  - English-type
- **Pitch contour** ("lexical pitch accent")
  - Japanese-type
- **Both stress and pitch contour**
  - Swedish-type
- **Neither stress nor pitch contour** ("unmarked accent")
  - French-type

Any of these kinds of prominent syllables can **attract a pitch accent (T*)** in intonation
In this talk, I’ll focus on intonational descriptions that assume AM Theory and that are based in acoustic work.

Why is the intonation of SALs interesting?

Traditional account: SAL intonation is rel. unconstrained
- Lexically noncontrastive prominence placement
- Prominence plays little/no role in intonation
- No clear signs of stress marking
- No lexical tone (with notable exceptions)
SOUTH ASIAN INTONATION

- Does that leave SAL intonation more vulnerable to:
  - Phonetic effects from segments?
  - Effects of phonological features of segments?
  - Stylistic or free variation?

- Traditional account: ironically, SAL intonation appears strikingly uniform
  - Identical patterns across related and unrelated lgs
  - Repetitive rising contours with little variation
  - Strict rules of tone alignment

- Maybe not so interesting after all?
In this talk, I hope to demonstrate that SAL intonation is more complex than previously described:

- There’s more than one type of “repetitive rising contour”
  - Major source of crosslinguistic variation
  - Variation within SALs: tone alignment is not uniform
- Prominence plays a role in variable tone alignment
- Segmental features play a major role as well
- Lexical features can determine tonal pattern
- Much more work is needed in these areas
**PROMINENCE: LADD’S TYPOLOGY**

- **Ladd’s typology of prominence marking** (Ladd 1996)

<table>
<thead>
<tr>
<th></th>
<th>Stress</th>
<th>No stress</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No lexically-specified pitch contour</strong></td>
<td>English, Dutch, German, Spanish, Portuguese, Italian, Polish, Greek…</td>
<td>French</td>
</tr>
<tr>
<td><strong>Lexically-specified pitch contour</strong></td>
<td>Swedish, Norwegian, Latvian, Lithuanian, Serbo-Croatian…</td>
<td>Japanese, Wu</td>
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- **No prominence: Seoul Korean, most tonal lgs**
## Ladd’s typology of prominence marking (Ladd 1996)

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</thead>
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<td>No lexically-</td>
<td>English, Dutch, German, Spanish, Portuguese, Italian, Polish, Greek...</td>
<td>French, “Bengali (and probably most of the languages of India)”</td>
</tr>
<tr>
<td>specified pitch</td>
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<tr>
<td>contour</td>
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</tr>
<tr>
<td>Lexically-specified</td>
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<td>pitch contour</td>
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<td>Japanese, Wu, “tonal” SALs</td>
</tr>
</tbody>
</table>

- **No prominence: Seoul Korean, most tonal lgs**
Some SALs are described as having **weight-sensitive prominence assignment** patterns:

- **Hindi-Urdu-type**: $\sigma$ with /i e ε a ɔ o u/ nucleus bears prominence, otherwise word-initial (Hussain 1997)

- **Assamese-type**: word-initial, unless 1$^{\text{st}}$ $\sigma$ is open and 2$^{\text{nd}}$ $\sigma$ is closed, in which case 2$^{\text{nd}}$ $\sigma$ (Mahanta 2001)

- Most SALs: **fixed word-initial**
- Without stress or other marking, how do we know?
Prominent σ’s show **phonologically privileged status**

For example, prominent (i.e. initial) syllables in Tamil...

Host **mid V length contrast** (Asher & Keane 2005)

- /oːtːu/ ‘drive’ vs. /oʈːuː/ ‘stick’
- /maran̥tɔːm/ ‘we forgot’ vs. */maran̥tɔm/

Allow coda nasals to remain **unassimilated** (Christdas 1988)


Show more **peripheral** production of /i u a/ (Keane 2003)
And prominent (i.e. initial) syllables in Bengali...

Host tense-lax V contrast (Dasgupta 2003, Khan 2008)
- /dɛkʰe/ 'see-3' vs. /dɛkʰe/ 'see-PRF', */dɛkʰɛ/, */dɛkʰɛ/
- /hɔtɔ/ 'casualties' vs. /hoṭɔ/ 'happen-CND-3', */hoṭɔ/, */hoṭɔ/
- /ɔn-/ 'NEG' + /ɛk/ 'one' → /ɔnek/ 'many'

Host oral-nasal V contrast (Dasgupta 2003, Khan 2008)
- /hãte/ 'walk-3' vs. /hate/ 'market-LOC', */hatɛ/, */hãtɛ/
- /ātːio/ < āmiya 'relatives'

Some loans get truncated so prominence remains initial (Khan 2008)
- /maʁkin/ < Eng [əˈmeːɹkin] 'American'
- /slaˈmalikum/ < Arb /asːaˈlaːmu ŋaˈlajkum/ '(Muslim greeting)’
So, we have evidence that SALs have prominent syllables
- Not typically accompanied by overt phonetic markings, e.g. stress
- Phonologically relevant

Crucially, we’ll see that phonologically prominent syllables attract the L target of L*, L*+H
Most cited observation suggesting common intonation: SALs have **repeated rising contours**.

Each rise roughly corresponds to a content word plus surrounding functional material:
- **Accentual phrase (AP)**: domain of a pitch accent
- **Phonological phrase (PP)**: domain of phonological process

Final AP/PP typically shows a **different pattern**.
Two rising APs in Nepali

/recording and IPA from Khatiwada (2009)/

The North Wind and the Sun.

/uttâri bâtas râ suryâ/

‘The North Wind and the Sun.’
Four rising APs (PPs) in **Assamese**

<table>
<thead>
<tr>
<th>tetiya</th>
<th>zatrizônê</th>
<th>tôtalikê</th>
<th>gôrôm</th>
<th>sûlatû</th>
<th>khuli</th>
<th>pelalê</th>
</tr>
</thead>
<tbody>
<tr>
<td>then</td>
<td>traveler-CL-ERG</td>
<td>immediately</td>
<td>warm</td>
<td>oversirt-CL</td>
<td>open-P RF</td>
<td>throw-PST-3</td>
</tr>
</tbody>
</table>

/tetiya zatrizônê tôtalikê gôrôm sûlatû kʰuli pelalê/

‘Then the traveler immediately threw off his warm cloak.’

Three rising APs in Bengali

\[/\text{ʃuɹdzo ɺəɾ gɔɹom ɺap tɛʰɾæɡ}/\]

‘The Sun spread out his/her warmth.’

Three rising APs in **Hindi**

- `/vəhi zjaːda bəlvaːn səmdʒʱə dʒəjɛgə/`
- ‘S/he will be considered stronger.’

LH in Harnsberger (1996), L*...H in Patil et al. (2008); recording and IPA from Ohala (1999)
Three rising APs in Sindhi

/Rising Contour/

- /हेवा है सिज बिन्ही कबुल केवो/
- ‘Wind and Sun both agreed…’

Recording and IPA from Nihalani (1999)
Three rising APs in **Telugu**

/veNTanee aː baaTasaari kambaLii vippiveesyDu/

‘Immediately the traveler threw off (his) cloak.’

Recording and IPA from Bhaskararao & Ray (2016 forthcoming)
Three rising APs in **Tamil**


‘The traveler kept pulling the blanket more tightly.’

Final AP/PP has a different pattern

Boundary tone (T%) aligned with the right edge of the larger intonation phrase (IP)
- IP is often the size of a clause/sentence

T% overrides the tones the AP/PP would otherwise end in

Typical IP boundary tones:
- Low falling L% in declaratives and wh questions
- High rising H% in various types of interrogatives
- Low rising LH% in continuation, and “polite” decl / wh questions
- Other attested tones HL%, LHL%, HLH% are more lg-specific
Temptation: assume that SALs have (essentially) the same intonational grammar

Some have proposed a single model for different SALs

Féry’s model of Bng, Hnd, Mlm, Tml (Féry 2010)
- Each PP has two boundary tones: $L_P$ on left, $H_P$ on right
- Final PP has $H_P$ on left boundary, IP’s $L_I$ on the right boundary
- No pitch accents needed; everything is boundary-driven
From my comparative work, I would propose a **weaker version** of that claim (Khan 2016).

Indeed, most SALs do share important prosodic traits.

But, crucial areas of variation:
- **L tone alignment**: prominence plays a role
- **H tone alignment**: length plays a role
- **Segmental effects**: voicing and length play a role
- **Lexical effects**: lexical pitch accent/tone in some lgs
- **IP tones**: inventory and tune–meaning relation
Alignment of L tone in AP/PP’s rising contour varies
- General pattern: word-initial
- Can shift rightward in Asm (Mahanta 2001), Hnd (Dyrud 2001)
- Location of prominent σ plays a role in Hnd

Asm Bng Hnd Npl Tlg Tml
(Asm) (Hnd)
**L TONE ALIGNMENT**

- **L* on word-initial σ** in most SALs, incl. Asm

- /uttôrôrô bôtaH aru xuIrzyôrô mazôt/
- ‘...between North Wind and Sun...’

Optional rightward shift of L* in Hnd (recording from Ohala 1999)
Available if prominence is noninitial (Dyrud 2001, Patil et al. 2008)

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<tbody>
<tr>
<td>L*</td>
<td>Ha</td>
<td>L*</td>
<td>Ha</td>
<td>L*</td>
<td>Ha</td>
<td>L*</td>
<td>L%</td>
</tr>
<tr>
<td>eek</td>
<td>mu</td>
<td>saa</td>
<td>fir</td>
<td>u</td>
<td>dhar</td>
<td>aa</td>
<td>nik</td>
</tr>
<tr>
<td>one</td>
<td>traveler</td>
<td>there</td>
<td>come</td>
<td>emerge-MSG</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

/ek mʊsafir ṵʱər a nɪkla/
‘A traveler came out towards them.’

LH in Harnsberger (1996), L*…H_p in Patil et al. (2008), recording and IPA from Ohala (1999)
Optional rightward shift of L* in Asm: L* <
Not tied to weight-sensitive prominence (cf. Mahanta 2001)

/transcribed L*...H_p in Twaha & Mahanta (2016), recording and IPA from Mahanta (2012)/
Hnd examples support that the AP/PP’s L target is:
- A pitch accent (L*) attracted to prominence (Genzel 2007, Patil et al. 2008)
- **Not a left-boundary tone** (aL or Lp) (contra Féry 2010)

But not all words with noninitial prominence show L* shift
- Variable attraction of L* to left-boundary and prominence?
- Need more data from SALs with Hnd-like pattern

- Asm is more mysterious: stylistic variation? Free variation?
- Perceptual data could be useful here
Most accounts of SALs describe strict right-boundary alignment of the AP/PP’s H tone: $\text{Ha}/H_P$ (Genzel 2007).

Ha/H_P location has proven useful in describing:
- Domains of segmental processes (Hayes & Lahiri 1991, Twaha & Mahanta 2016)
- Prosodic disambiguation of syntax (Lahiri & Fitzpatrick-Cole 1999)

But occasionally, researchers mention a mysteriously early realization of this H:
- $H$ on 2$^{nd}$ σ in Bng, Tml: complex pitch accent? (Khan 2014, Keane 2014)
- Double H in Tml: two APs in one word? (Keane 2014)
Preliminary findings from comparative work suggest:

- **AP-final** (Asm, Bng, Npl, Hnd, Tml): \( L^* \ldots Ha \)
- **2\textsuperscript{nd}/3\textsuperscript{rd} \( \sigma \)** (Tlg, Tml; alt. Bng, alt. Npl): \( L^* + H \)
- **Double rise** (Tml): \( L^* + H \ldots LHa \)
- **New! Plateau** (Tlg): \( L^* + H \ldots Ha \)
AP-final H is the default in most SALs, incl. Asm: L*...Ha

/transcribed L*...Hₚ in Twaha & Mahanta (2016), recording and IPA from Mahanta (2012)/
H TONE ALIGNMENT

- **H on 2\textsuperscript{nd}/3\textsuperscript{rd} σ** seems to be a stylistic choice in Bng: $L^*+H$

- "/ɔbɔsɛsɛ uːtɔr hɑ̃a mene niːte bɑdʱ:ɔ holo/"
- ‘In the end, the North Wind was obliged to accept...’

H TONE ALIGNMENT

- **H on 2\textsuperscript{nd}/3\textsuperscript{rd} \(\sigma\) may be the default pattern in Tml: \(L^*+H\)**

- /atu p\(\text{\v{a}}\)ta\(\text{j\text{"a}}\)\text{"a}\	ext{"i}le \(d\text{\j{e}}\text{\j{t}}\text{\j{s}}\)\text{"u}\(\text{\r{u}}\text{\t\text{\j{s}}}\)\text{"u}\(\text{n\text{"u}}\)/
- ‘...the one who won that wager...’

Transcribed \(L^*...H\) in Keane (2014), recording and IPA from Keane (2004)
Double rise is seen in longer APs in Tml: \( L^* + H \ldots LHa \)

Transcribed \( L^* \ldots H \ldots L^* \ldots H \) in Keane (2014), recording from Keane (2014), IPA from Keane (2004)

\[ /anta \ ma:\eta\:van \ in\:ke:\:ve:\:kama:\:ka \ vanta \ irunta:\:n/ \]

‘That student has come here quickly (and stayed).’
Tlg has **plateau** from \(2^{\text{nd}}/3^{\text{rd}}\) \(\sigma\) to **last long V**: \(L^*+H\ldots Ha\)

\[\begin{array}{lllllllllllllll}
\hline
 & L^*+H & L^*+H & L^*+H & Ha & L^*+H & & & & & & & L^% \\
\hline
\text{ap} & \text{pu} & \text{Du} & \text{suur} & \text{yu} & \text{Du} & \text{vee} & \text{Di} & \text{gaa} & \text{pra} & \text{kaa} & \text{sin} & \text{cee} & \text{Du} \\
\text{then} & \text{sun-M} & \text{heat-ADV} & \text{shine-INF-do-PST-3MSG} & & & & & & & & & & \\
\hline
\end{array}\]

- ‘Then the Sun shined warmly.’

Recording and IPA from Bhaskararao & Ray (2016 forthcoming)
Presence of Ha in Tlg depends on long V, IP overriding

/oke bəːtəsə:rəi ɗələsəɾi kəmbəli: kəppukoni ʋeʃtuːŋpəːɡə:/
‘As a traveler was coming wrapped in a thick cloak...’

Recording and IPA from Bhaskararao & Ray (2016 forthcoming)
H TONE ALIGNMENT

- AP/PP’s H target can be aligned to 3 different locations:
  - **Right boundary**: (L)Ha
  - **Immediately post-prominence**: L*+H
  - **Rightmost long vowel**: Ha (Tlg)

- Ha in Tlg acts like an AP boundary tone
  - Targets the **rightmost** long V in AP
  - Not seen when IP-final: **overridden by T%**?

- May be the first claim of **tonal attraction to V length**
- Need to test words of **different lengths, # of long Vs**
- Need to examine similar lgs with **short vs. long Vs**
Rising contours also vary in *tonal realization* from interactions with phonetics and information structure.

**Segmental effects**
- L* is raised following voiceless and null onsets: ^L*
- Well-established phonetic connection (Kingston 2011)
- But, appears exaggerated; native speakers often transcribe them as H* or M* (Mahesh 2016)
- Beginnings of an emergent contrast? (Purcell et al. 1978)

**Focus prosody**
Focus realization in some SALs is fairly well documented.

Common themes resemble phonetic exaggeration:
- **Perceptible stress**: longer, louder, stronger
- **Higher pitch** within focal domain
- **Compression of post-focal tones**

Possible areas of variation:
- **Phrasing**: placing boundary tones before and/or after focus
- **Preference for early H** (L*+H) rather than final H (Ha/H_P)
- Documentation of **within-lg variation**
Dialect-specific variation within Bengali?

**Bangladeshi Stnd: 3 focus realizations** (Khan 2008/2014)
- Broad/no focus: \(L^*...Ha\)
- Morphologically marked focus: \(L^*...fHa\) (raised Ha)
- Wh answer / corrective focus: \(L^*+fH\) (raised early H)
- Unexpected information focus: \(fH^*\) (change of target)

**Kolkata Stnd: variations of 1 realization**
- Broad/no focus: \(L^*...H_P\) (Hayes & Lahiri 1991)
- Morphologically marked focus: \(L^*...H^*\) (Lahiri & Fitpatrick-Cole 1999)
- Wh answer focus: raised \(L^*...H_P\) (Choudhury & Kaiser 2012)
- Corrective focus: further raised \(L^*...H_P\) (Choudhury & Kaiser 2012)
- Perceptually distinct (Choudhury & Kaiser 2012)
Bangladeshi Bengali has at least three realization strategies of focus (Khan 2008/2014)

[monoəra romilake nie elo]

‘Monoara brought Romila.’
Bangladeshi Bengali has at least three realization strategies of focus (Khan 2008/2014)

- Monoara (only) brought Romila (and no one else).
Bangladeshi Bengali has at least three realization strategies of focus (Khan 2008/2014)

- Monoara brought Romila, (not Rumu).’
Ongoing research finds evidence of a fourth realization of focus in Bengali: $H^* + fH$ (Ullah 2016)

$H^* + fH$ is **used on “k-words”** (e.g. [kon] ‘which’, [kon-o] ‘any’) when acting as:
- Wh question words
- NPIs in negative declaratives

But it is **never** used on k-words in:
- Yes/no questions
- Epistemically biased positive declaratives

More details in his poster later today
Lexical Effects

- This brings us to one last area of intonational variation that I’d like to cover: role of **lexical contrast** in tone selection.

- Two major areas of SALs with lexical tone(-like) properties:
  - **Indic lgs** that have undergone **tonogenesis**
  - **Tibeto-Burman lgs** that maintain a **lexical tone**-like system
Impressionistic accounts of Pnj (Gill & Gleason 1962, Bhatia 1993)
- Low(-rising) tone on CV < *Cʰ
- High(-falling) tone on VC < *Cʰ

<table>
<thead>
<tr>
<th>kōta</th>
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</thead>
<tbody>
<tr>
<td>kōɾā</td>
<td>kōɾā</td>
<td>kōɾhā</td>
</tr>
<tr>
<td>‘whip’</td>
<td>‘horse’</td>
<td>‘leprosy patient’</td>
</tr>
</tbody>
</table>

Phonologization of phonetic effects of voi/asp on pitch
- Hnd has smaller variations like those of Pnj (Purcell et al. 1978)

Concerns:
- Little/no evidence provided
- Stimuli elicited in isolation: effects of IP boundary tone
Recent work addresses these concerns (Kanwal & Ritchart 2015)

- **High-falling** (not low-rising) tone on CV < *Cʱ: looks like H*+L
- Pitch rises across the word elsewhere: looks like L*...Ha

Additional finding:

- **Sig. variation in pitch based on onset voicing**
  - Similar to ^L* (Khan 2016)

Remaining questions:

- Vs preceding C < *Cʱ?
- Intonational tones?
- Salience of variation?
New acoustic work on Sylheti (Gope & Mahanta 2014)
- Recordings of phrase-medial monosyllables
- **Aspiration** contrast lost, CVC < *CʰVC bears sig. higher pitch

Example:
- /bàṭ/ 'arthritis'
- /bát/ 'rice' (< /bʱəṭ/)

Further questions:
- **Endpoint** for the 2 words is not the same
- Does Sylheti tone affect AP’s L and H?

Figure 3: *normalized pitch tracks for [bɔt]*, (n=27, {9 speakers * 3 iterations each})
Boro (Das & Mahanta 2015)
- Each lexical item has a **lexical tone** (L, H)
- Contrast appears on **final syllable**
- Interacts with morphological focus marking

Dimasa (Mahanta & Raychoudhury 2016)
- Each lexical item has a **lexical tone** (L, M, H)
- Contrast appears on **final syllable**
- Interacts with IP boundary tone

Intonation is clearly relevant, but the non-lexical parts of TB intonation remain underdocumented
Going back to our original question
Is there a “typical” SAL intonation?

In some ways, yes:
- Prominence placement is **not contrastive**
- Prominence not **marked with stress**
- **Sequences of AP/PPs** marked with **rising contours**
- **Segmental effects** on L tone realization
Beyond that, there are wide **differences within/across lgs**
- AP/PP’s **L tone** can aim for **left edge**, **prominence**, or **both**
- AP/PP’s **H tone** can aim for **right edge**, **prominence**, or **both**
- But most common Indic pattern: L*...Ha/Hp

More complex patterns in Dravidian?
- **Word length** promotes **double H** in Tamil
- **Vowel length** creates **H plateaus** in Telugu

Additional complexities
- **Focus** can manifest in **different strategies** in Bengali
- **Lexical specifications** of tone in Punjabi, Sylheti, most TB lgs, etc.
Many questions remain, even for SALs that have been studied in AM Theory

What factors **block attraction** of pitch accents to **noninitial prominence** in lgs like Hnd?

**How pervasive** is tone alignment to **V length** beyond Tlg?

**How perceptible** is L*’s rightward shift in Asm?

**How perceptible** is L* vs. ^L*? Emergent contrast?

**Interaction** of lexical and intonational tones?

**Most SALs remain unexplored** in AM Theory

Get to know your local intonationologist, and let’s get to work on your favorite SAL!
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