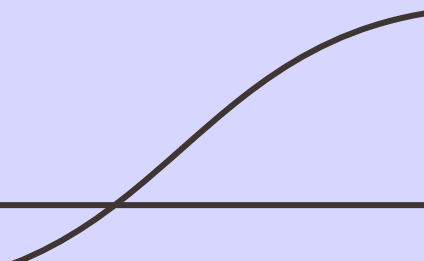


The Syntax-Prosody of Attachment Ambiguities in Korean: Implications on Intonational Phrase-Mapping

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This Talk: Theoretical Implications

Research Question

What counts as a syntactic “clause” in the mapping to intonational phrases (ι) in the prosodic representation? (Match)

Focus of Analysis

How **t-level prosody resolves syntactic ambiguities** in the placement of verbal modifiers in Korean

Assumptions

- i) Indirect reference w.r.t. syntax-prosody mapping
- ii) Implementation of syntax-prosody mapping via OT constraints (Selkirk 2011; Selkirk & Lee 2015)

Disclaimer

There's a *lot* to keep track of in this data — syntax, semantics, and prosody (including trees!). Please stop me anytime to ask questions, slow down, or repeat.

We can keep this a discussion format too — lot's to talk about!

This Talk: Roadmap

01 Background

- Syntax-prosody interface (theories, ambiguity resolution)
- Korean prosody

02 Data

- Resolution of Korean attachment ambiguities via ι -boundary placement (= left edge of CP)

03 Analysis

- Overview of OT implementation (Generalized Alignment over Match constraints)
- Incompatibility of Match constraints

04 Discussion

- Implications on ι -mapping
- Bonus: interactions with pragmatic context

Background: Match Theory (Selkirk 2009, 2011)

- Correspondence between syntactic constituency & prosodic constituency modulated by “constituent faithfulness” OT constraints
- Assumes the prosodic constituency is hierarchical (Selkirk 1986, Nesper & Vogel 1986, *i.a.*):
 - ω (prosodic word) < φ (phonological phrase) < ι (intonation phrase)
- MATCH(clause, ι): a clause in the syntax must match to an ι in the prosodic representation ($\leadsto$ “left & right edges of a clause must map to left & right edges of an ι ”)
 - What counts as a clause? CP (Truckenbrodt 2005, Pak 2008)
 - Other answers: TP (Zerbian 2006), highest verbal projection (Hamlaoui & Szendrői 2015), speech acts & parentheticals (Güneş 2015), spell-out domain of higher phase head (Kratzer & Selkirk 2007; Selkirk 2009)

Background: Alignment Theory (Selkirk 1986, 1996)

- Precursor to Match theory
- The mapping from syntactic to prosodic constituency is sensitive to only the edges of syntactic constituents
 - Follows the Generalized Alignment approach of McCarthy & Prince (1993)
- Align-L(α , π): The left edge of a constituent type α in the input syntactic representation must correspond to the left edge of a constituent of type π in the output phonological representation.
 - There is also Align-R(α , π)
- While Alignment Theory has separate constraints localized to one edge (e.g., left), the constraints in Match Theory enforce the mapping of *both* left & right edges

Background: Prosody resolving syntactic ambiguity

- Language production: in English, language users manipulate the prosodic cues of spoken strings that are syntactically ambiguous in order to privilege one interpretation of that string over another
 - Reliable cue = placement of boundaries of is
 - Salient referential context with need to disambiguate (Snedeker & Trueswell 2003)
- Language comprehension: placement of I-boundaries has a significant effect on English listeners' interpretations of syntactically ambiguous utterances (Snedeker & Casserly 2010)
- Same set of facts for Korean (Jun 2003 for production; Kang & Speer 2005 for comprehension)

Example of ambiguity & prosody

- When you learn gradually you worry more.

- 他吃不下什麼

ta chi bu xia shenme

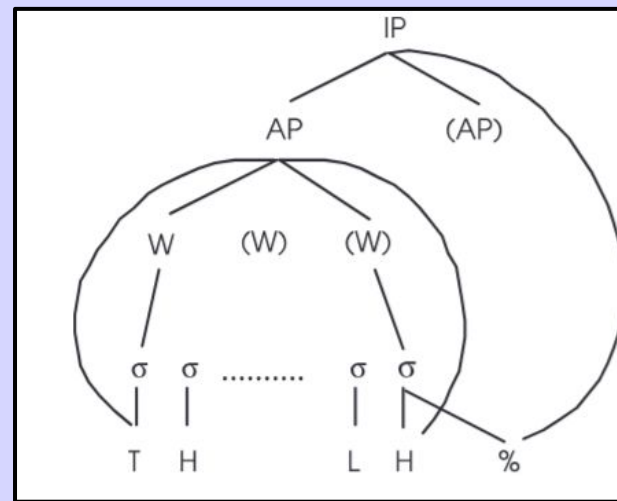
1SG eat NEG down what

(a) He cannot eat anything

(b) What can't he eat?

Background: Korean prosody (Jun 1996, 2005)

- Jun's Intonational Model: prosodic phrasing is conditioned by intonation patterns (= the output tonal patterns of an utterance or part of an utterance)
 - Little work bridging this with Match
- Cues for intonational phrase (IP in Jun's work) → on the right edge
 - Falling boundary tone (HL%)
 - Final σ -lengthening
 - Pause (= optional)



Prosodic constituent structure of Seoul Korean (Jun 2005:205)

02

Korean Data

(= Seoul Korean)

Data format

- Focus: Attachment ambiguities following the form schematized in (1)
- Each form will feature:
 - A sentence-initial agent NP (NP_{AG})
 - A theme NP (NP_{TH}) + relative clause
 - A modifier ambiguous in its placement
- The modifier can either attach to the matrix clause and be interpreted with respect to NP_{AG} , as in (a), or attach to the embedded clause and be interpreted w.r.t. NP_{TH}

- (1) NP_{AG} **Modifier** V_{RC} NP_{TH} V_{MATRIX}
- a. NP_{AG} **Modifier** [V_{RC}] NP_{TH} V_{MATRIX} (Modifier $\leftrightarrow$ NP_{AG})
- b. NP_{AG} [**Modifier** V_{RC}] NP_{TH} V_{MATRIX} (Modifier $\leftrightarrow$ NP_{TH})

- Convention for (a) and (b) readings

Data format (con't)

- The modifier of primary interest will be a lexical verb marked by the adverbial suffix *-myense* (indicates simultaneity; Yeon & Brown 2019)
- Unambiguous example in (2): *-myense* can only be interpreted w.r.t. 'Yumi'

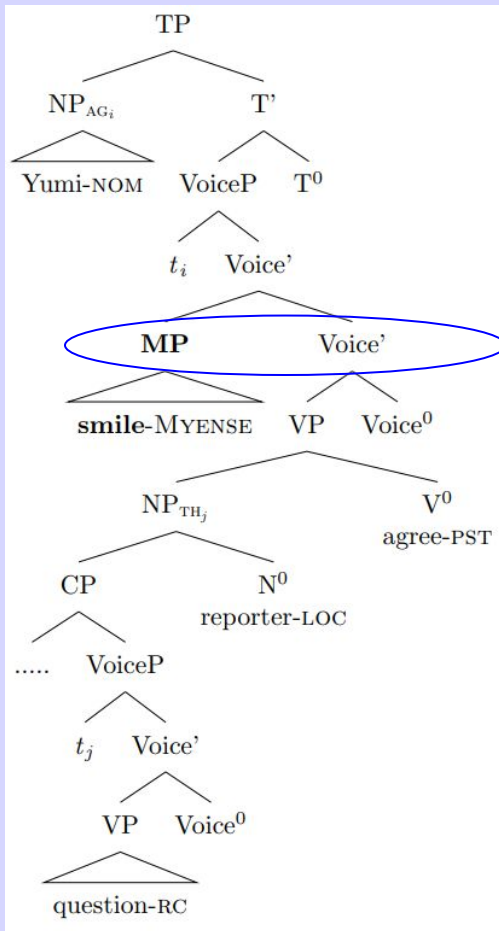
(2) 유미가 웃으면서 기자에 동의했어
Yumi-ka **wus-umyense** kica-ey tonguyhay-sse
Yumi-NOM smile-MYENSE reporter-LOC agree-PST
Yumi, while smiling, agreed with the reporter who was asking questions

- Assumptions
 - At least VP-sized (can take a direct object); smaller than a CP
 - Forms a M(yense)P
 - Agent-oriented; attachment site = VoiceP

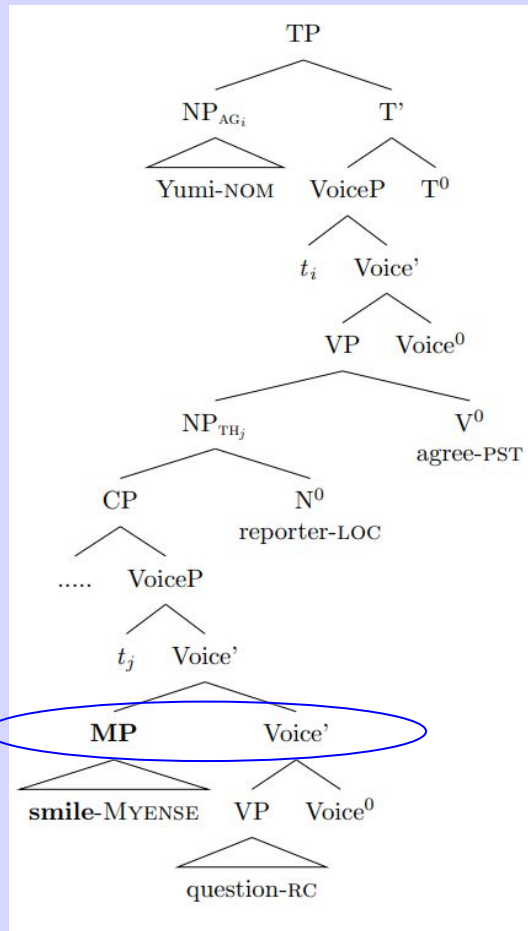
Ambiguous data

- (3) 유미가 웃으면서 질문하는 기자에 동의했어
Yumi-ka **wus-umyense** cilmwun-hanun kica-ey tonguyhay-sse
Yumi-NOM smile-MYENSE question-RC reporter-LOC agree-PST
a. Yumi, while smiling, agreed with the reporter who was asking questions
b. Yumi agreed with the reporter who was asking questions and smiling
(adapted from Kang & Speer 2005:246, ex. (4))

(a)



(b)



Previous work: Kang & Speer (2005)

- Conducted comprehension tasks to determine the effects of prosody on resolving attachment ambiguities in Korean
- Played participants audio recordings of (1) that differ in the placements of I-boundaries
 - I-boundary following wus-umyense
 - I-boundary preceding wus-umyense
 - Participants were asked their interpretation for each recording (i.e., who is doing the smiling?)

(3) 유미가	웃으면서	질문하는	기자에	동의했어
Yumi-ka	wus-umyense	cilmwun-hanun	kica-ey	tonguyhay-sse
Yumi-NOM	smile-MYENSE	question-RC	reporter-LOC	agree-PST
a. Yumi, while smiling, agreed with the reporter who was asking questions				
b. Yumi agreed with the reporter who was asking questions and smiling				
(adapted from Kang & Speer 2005:246, ex. (4))				

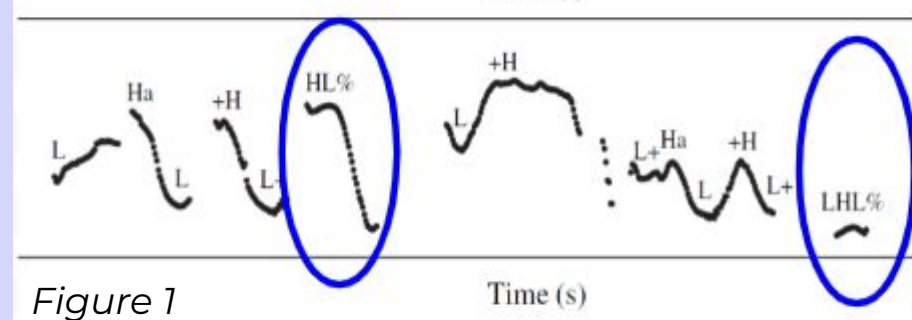
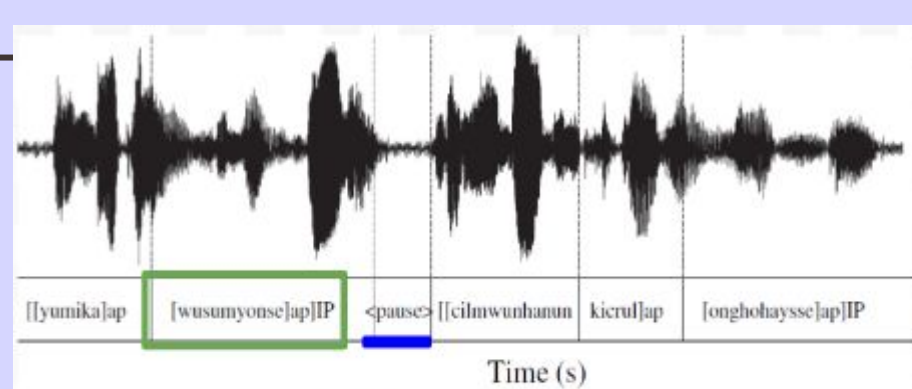


Figure 1

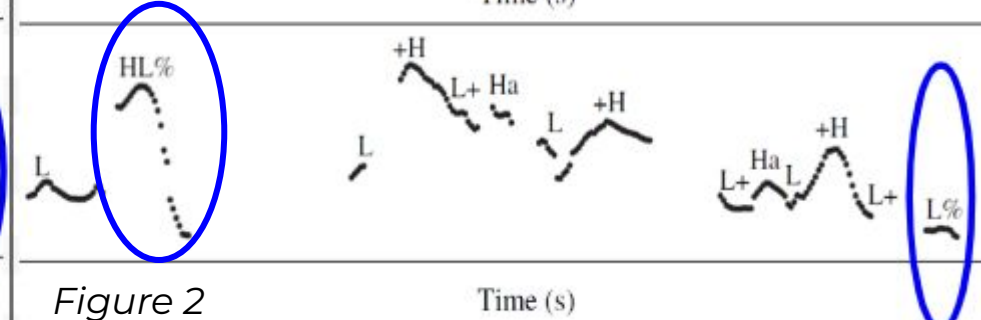
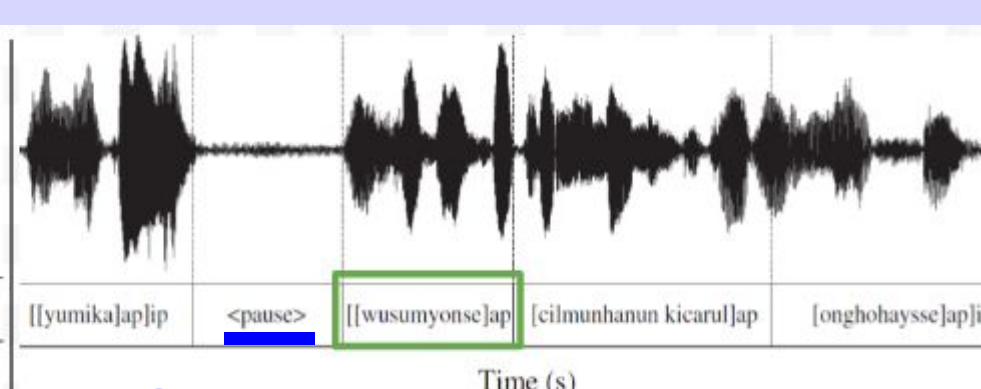
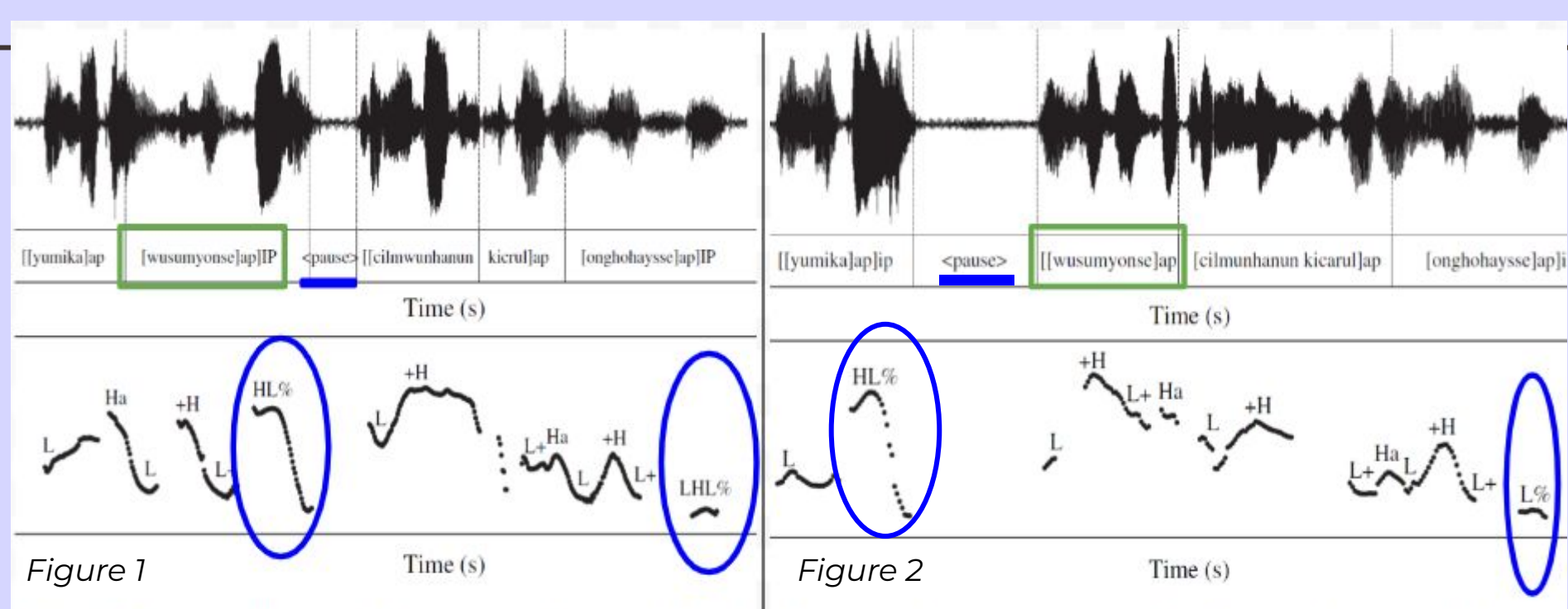


Figure 2

Post-modifier boundary: bias = (a) No post-modifier boundary: bias = (b)

(3) 유미가	웃으면서	질문하는	기자에	동의했어
Yumi-ka	wus-umyense	cilmwun-hanun	kica-ey	tonguyhay-sse
Yumi-NOM	smile-MYENSE	question-RC	reporter-LOC	agree-PST
a. Yumi, while smiling, agreed with the reporter who was asking questions				
b. Yumi agreed with the reporter who was asking questions and smiling				
(adapted from Kang & Speer 2005:246, ex. (4))				



Post-modifier boundary: bias = (a) No post-modifier boundary: bias = (b)

***What gives rise to these sensitivities in listeners?
 Why in this direction? Is this productive?***

Methodology

- Elicitations with native speakers of Seoul Korean (all from Gyeonggi Province)
- Ambiguous form displayed to speakers, followed by presentation of salient context to strongly bias interpretation of form — toward (a) or (b)
- Recorded pronunciation following presentation of referential context

(3) 유미가	웃으면서	질문하는	기자에	동의했어
Yumi-ka	wus-umyense	cilmwun-hanun	kica-ey	tonguyhay-sse
Yumi-NOM	smile-MYENSE	question-RC	reporter-LOC	agree-PST
a. Yumi, while smiling, agreed with the reporter who was asking questions				
b. Yumi agreed with the reporter who was asking questions and smiling				
(adapted from Kang & Speer 2005:246, ex. (4))				

Context: Yumi is attending an event where there is a famous politician and a reporter questioning that politician.
a) The politician is someone that Yumi likes
b) Yumi doesn't like the politician

Results

(3) 유미가	웃으면서	질문하는	기자에	동의했어
Yumi-ka	wus-umyense	cilmwun-hanun	kica-ey	tonguyhay-sse
Yumi-NOM	smile-MYENSE	question-RC	reporter-LOC	agree-PST
a. Yumi, while smiling, agreed with the reporter who was asking questions				
b. Yumi agreed with the reporter who was asking questions and smiling				
(adapted from Kang & Speer 2005:246, ex. (4))				

(a)  Yumi is smiling

(b)  The reporter is smiling

Reminder of relevant prosodic cues

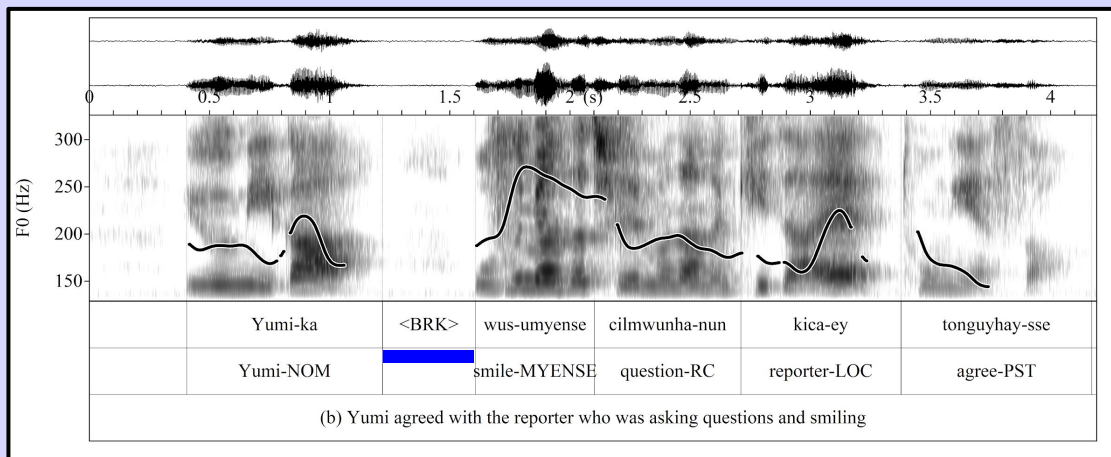
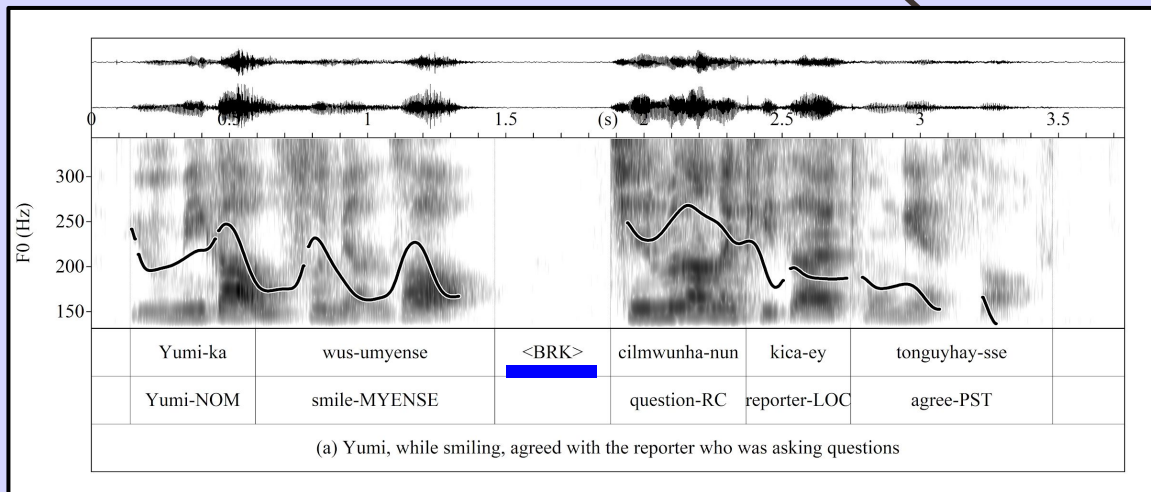
- Cues for intonational phrase (IP in Jun's work) → on the right edge
 - Falling boundary tone (HL%)
 - Final σ -lengthening
 - Pause (= optional)

Results

(a)  Yumi is smiling

(b)  The reporter is smiling

⇒ Aligns with from Kang & Speer's (2005) finding from the perception side



Other examples

(5) 종이 쳤을 때 민규가 놀면서 말하는 친구를 쳤어
bell-NOM ring-PST-RC time Minkyu-NOM **play-MYENSE** speak-RC friend-AC chye-sse
cong-i chy-ess-ul ttay Minkyu-ka nol-myense malha-nun chinkwu-lul tap-PST

 a. While the bell was ringing, Minkyu, while playing, tapped his friend who was talking

 b. While the bell was ringing, Minkyu tapped his friend who was talking and playing

(6) 학생이 라면을 먹으면서 가르치는 선생님을 봤어
haksayng-i lamyen-ul **mek-umyense** kaluchi-nun sensayngnim-ul pwa-sse
student-NOM ramen-ACC eat-MYENSE teach-RC teacher-ACC see-PST

 a. A student, while eating ramen, saw the teacher who was teaching

 b. A student saw the teacher who was teaching and eating ramen

Other examples

(a)  Student is eating ramen

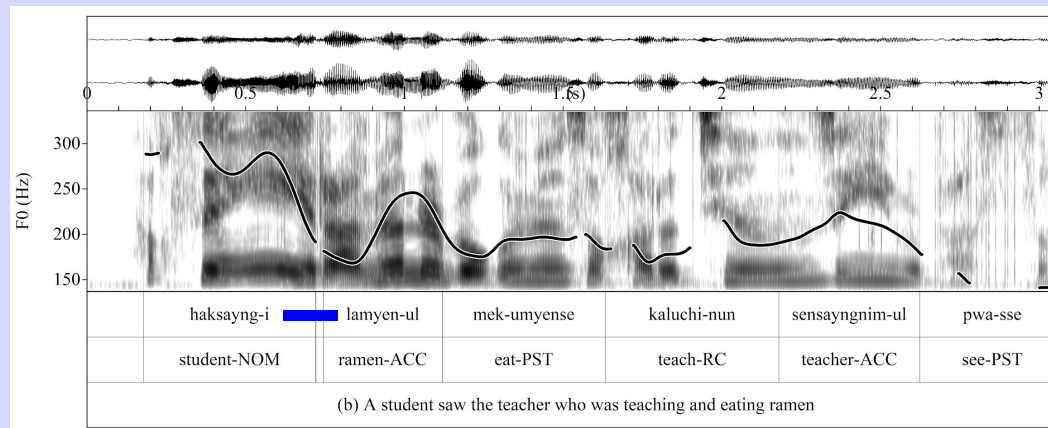
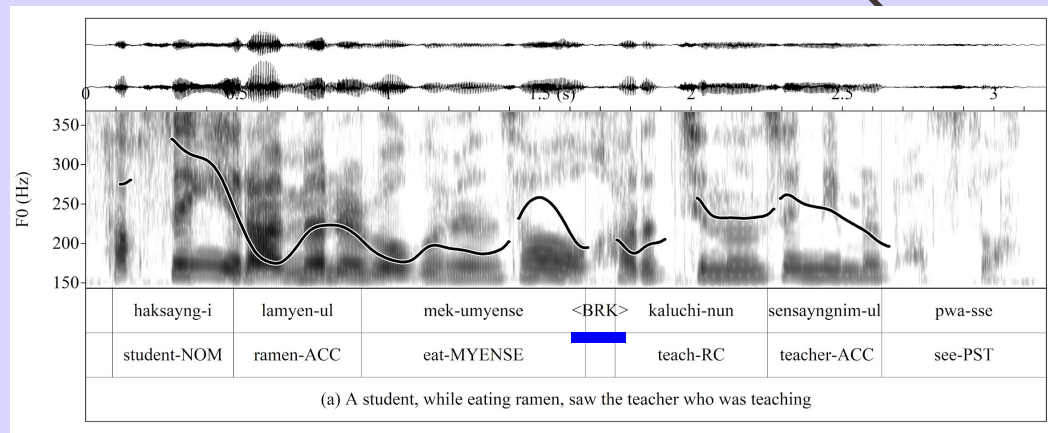
(b)  Teacher is eating ramen

⇒ Generalization (to be refined):

(a) ι-boundary follows the modifier constituent

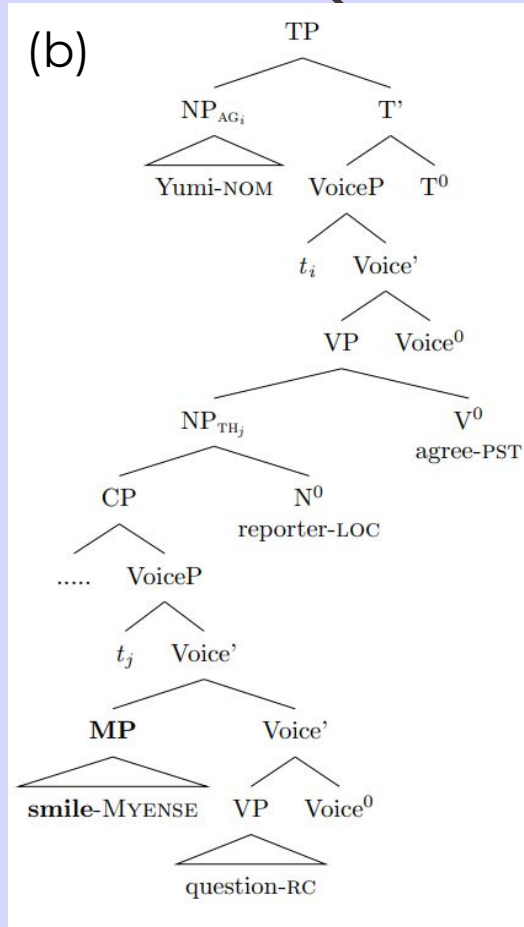
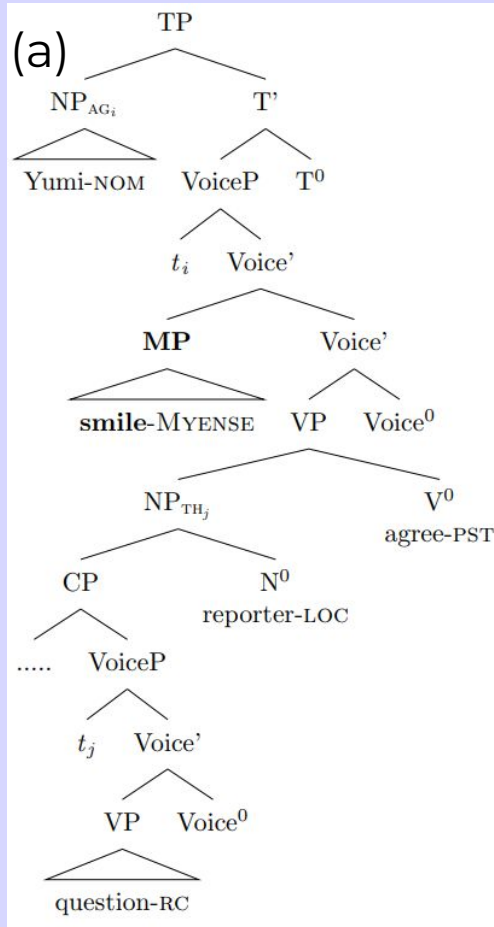
(b) ι-boundary precedes the modifier constituent

⇒ Why?



Back to the syntax

- (1) NP_{AG} **Modifier** V_{RC} NP_{TH} V_{MATRIX}
 a. NP_{AG} **Modifier** [V_{RC}] NP_{TH} V_{MATRIX}
 b. NP_{AG} [**Modifier** V_{RC}] NP_{TH} V_{MATRIX}



Back to the syntax

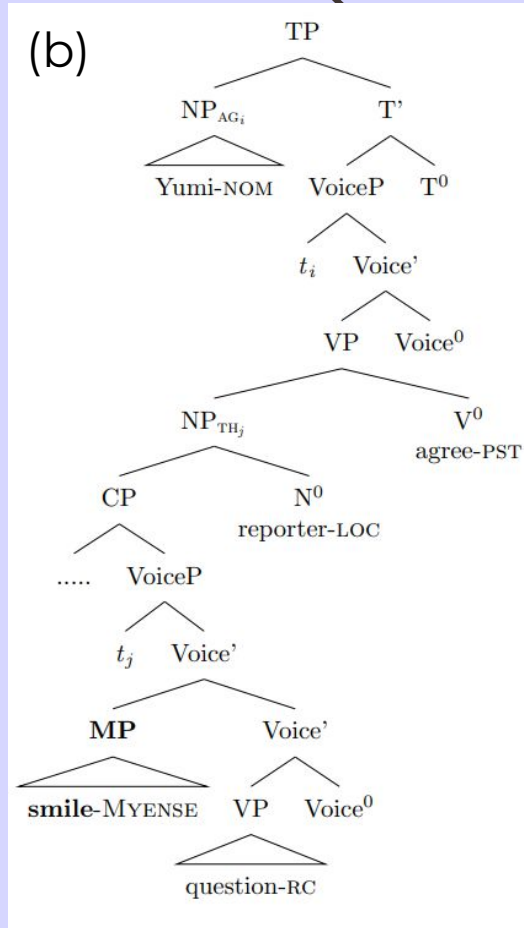
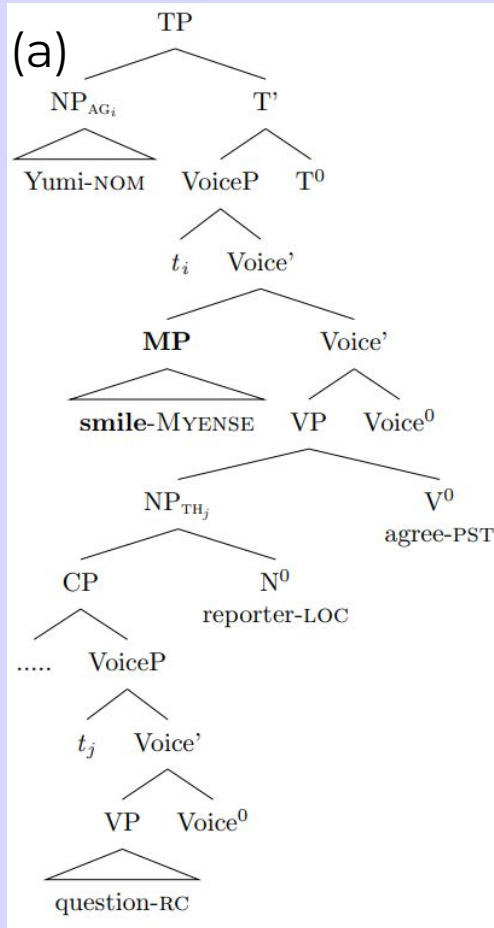
| = ι -boundary

(1) NP_{AG} **Modifier** V_{RC} NP_{TH} V_{MATRIX}

a. NP_{AG} **Modifier** [V_{RC}] NP_{TH}

b. NP_{AG} [**Modifier** V_{RC}] NP_{TH}

V_{MATRIX} ⇒ Generalization: The ι -boundary surfaces at the left edge of the embedded CP
⇒ Not an idiosyncratic property of the *-myense* modifier



Other modifiers

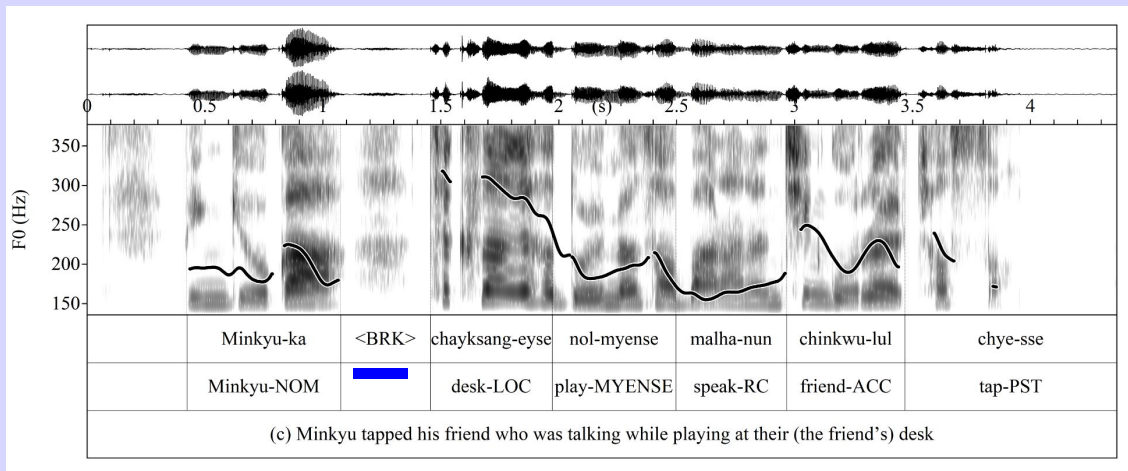
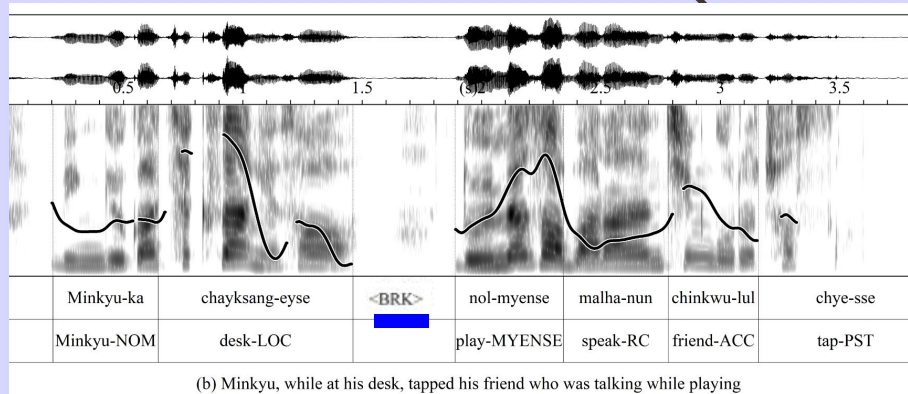
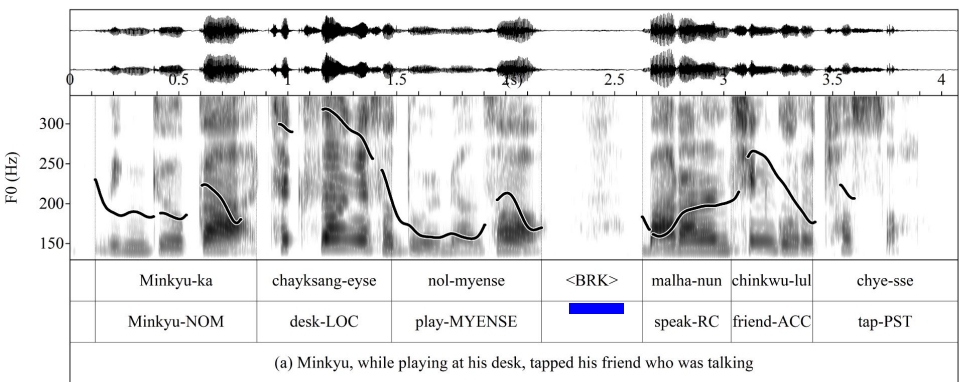
(7) 엄마가 거실에서 아들이 공부하는 걸 봤어
emma-ka **kesil-eyse** atul-i kongpwuha-nun kel pwa-sse
mother-NOM living.room-LOC son-NOM study-RC NMNL see-PST

a. The mother_i, while in_i the living room, saw (the event of) her son_j studying_j

b. The mother_i saw her son_j studying in_j the living room

Other modifiers (con't)

- (8) 민규가 책상에서 놀면서 말하는 친구를 쳤어
Minkyu-ka **chayksang-eyse nol-myense** malha-nun chinkwu-lul chye-sse
Minkyu-NOM desk-LOC play-MYENSE speak-RC friend-ACC tap-PST
a. Minkyu_i, while playing_i at his_i desk, tapped his friend_j who was talking.
b. Minkyu_i, while at his_i desk, tapped his friend_j who was talking while playing_j.
c. Minkyu_i tapped his friend_j who was talking while playing_j at their_j desk.



Summary of generalization

- In syntactically-ambiguous forms with an embedded CP, the left edge of that CP maps to an ι -boundary, resulting in an ι -boundary following the modifier when it's adjoined in the matrix clause (a), and an ι -boundary preceding the modifier when it's inside the embedded clause (b)

 = ι -boundary

NP_{AG} **Modifier** V_{RC} NP_{TH} V_{MATRIX}
 a. NP_{AG} **Modifier**  [V_{RC}] NP_{TH} V_{MATRIX}
 b. NP_{AC}  [**Modifier** V_{RC}] NP_{TH} V_{MATRIX}

- Aligns with the insight of Match theory that there is a correspondence between syntactic constituency (CP) and prosodic constituency (ι)
- Departure from Match: right edges do not partake in ι -mapping

Right edges

- Sentential minimal pair of right edge of modifier (9) and right edge of CP (10); only the former permits a following ι -boundary
 - (10) suggests the *right* CP-edge *does not* partake in ι -mapping

(9) 아버지가 밥을 먹으면서 (BRK) 아들을 쳐다봤어
apeci-ka pap-ul mek-umyense atul-ul chyetapwa-sse
father-NOM food-ACC eat-MYENSE son-ACC gaze-PST
The father, while eating, gazed at his son.

(10) 아버지가 밥을 먹는 (*BRK) 아들을 쳐다봤어
apeci-ka pap-ul mek-nun atul-ul chyetapwa-sse
father-NOM food-ACC eat-RC son-ACC gaze-PST
The father gazed at his son who was eating.

Aside: cross-linguistic applicability

Japanese

(11a) ユミが 笑いながら 質問する 記者に 同意-した
Yumi-ga warai-nagara shitsumon-suru kisha-ni dōi-shita
Yumi-NOM laugh-NAGARA question-RC reporter-DAT agree-do.PST
Yumi, while laughing, agreed with the reporter who was asking questions

(11b) ユミが 笑いながら 質問する 記者に 同意-した
Yumi-ga warai-nagara shitsumon-suru kisha-ni dōi-shita
Yumi-NOM laugh-NAGARA question-RC reporter-DAT agree-do.PST
Yumi agreed with the reporter who was laughing and asking questions

Aside: cross-linguistic applicability

Kazakh

(12a) ǰalıǰa kıl-ıp tır-ǵp | sıraǵ qoj-ǵp tır-ǰan žurnalist-pen kelıs-tı
Galiya smile-CVB stand-CVB | question ask-CVB stand-PTCP journalist-with agree-PST
Galiya, while smiling, agreed with the reporter who was asking questions

(12b) ǰalıǰa | kıl-ıp tır-ǵp sıraǵ qoj-ǵp tır-ǰan žurnalist-pen kelıs-tı
Galiya | smile-CVB stand-CVB question ask-CVB stand-PTCP journalist-with agree-PST
Galiya agreed with the reporter who was smiling and asking questions

03

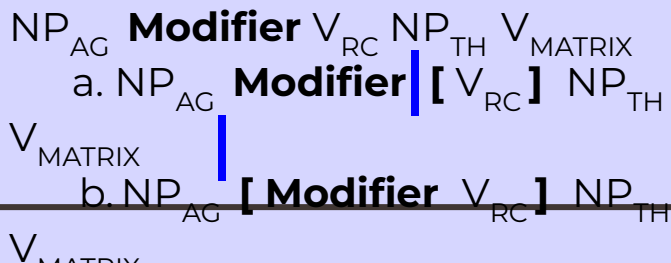
Analysis

Output prosodic trees, constraints

Overview

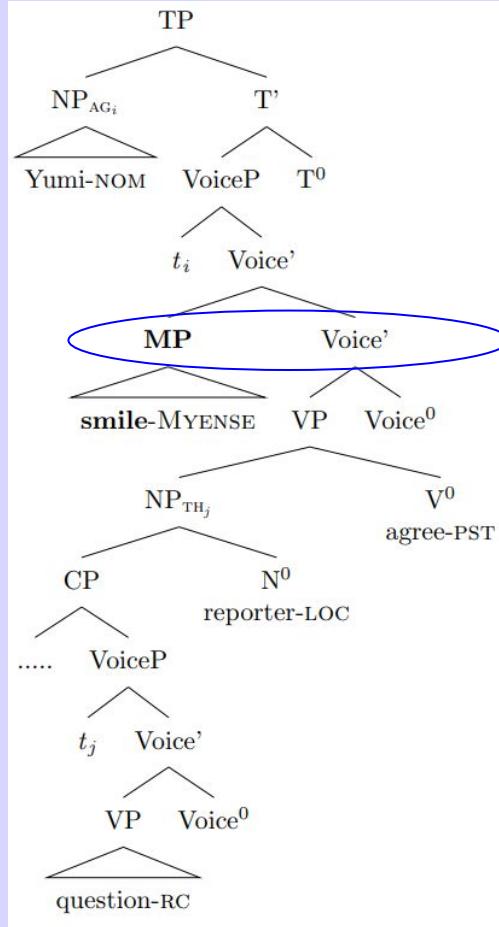
- Desideratum: Constraint set, with a consistent ranking, that derives the correct syntax-prosody correspondences (input syntactic trees → output prosodic trees)
- Focus of this discussion: (3), below — all structurally similar forms are predicted to pattern with this datum

(3) 유미가	웃으면서	질문하는	기자에	동의했어
Yumi-ka	wus-umyense	cilmwun-hanun	kica-ey	tonguyhay-sse
Yumi-NOM	smile-MYENSE	question-RC	reporter-LOC	agree-PST
a. Yumi, while smiling, agreed with the reporter who was asking questions				
b. Yumi agreed with the reporter who was asking questions and smiling				
(adapted from Kang & Speer 2005:246, ex. (4))				

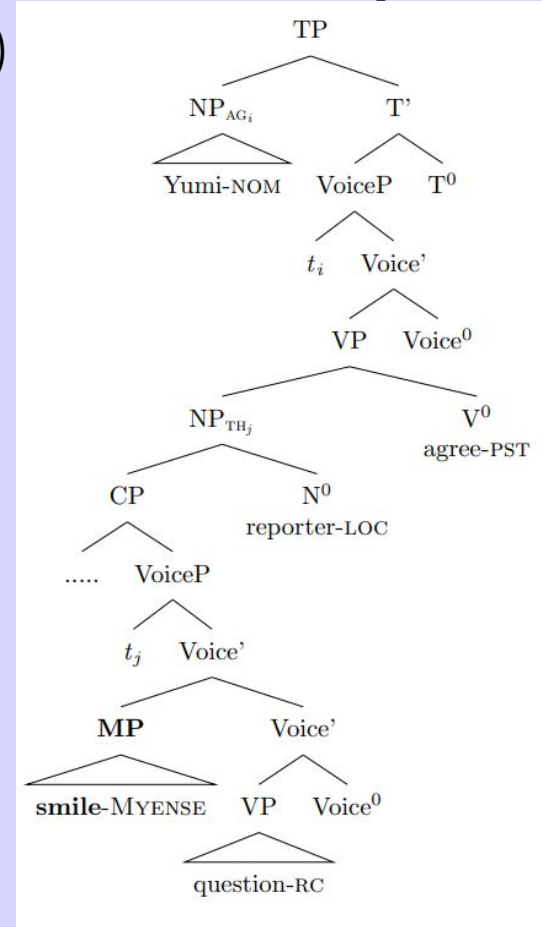


Review of syntactic representations

(a)



(b)

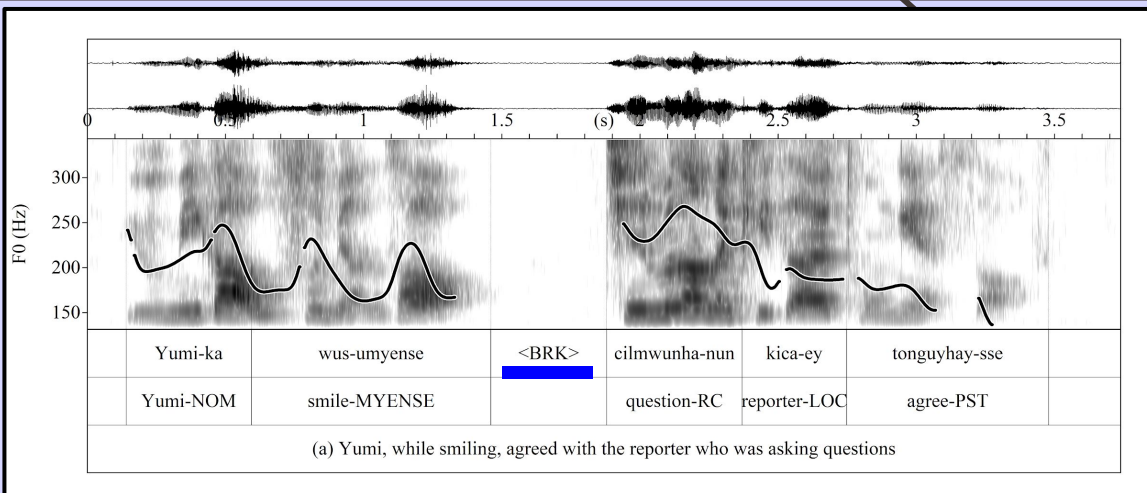


Upcoming:
Corresponding
prosodic trees

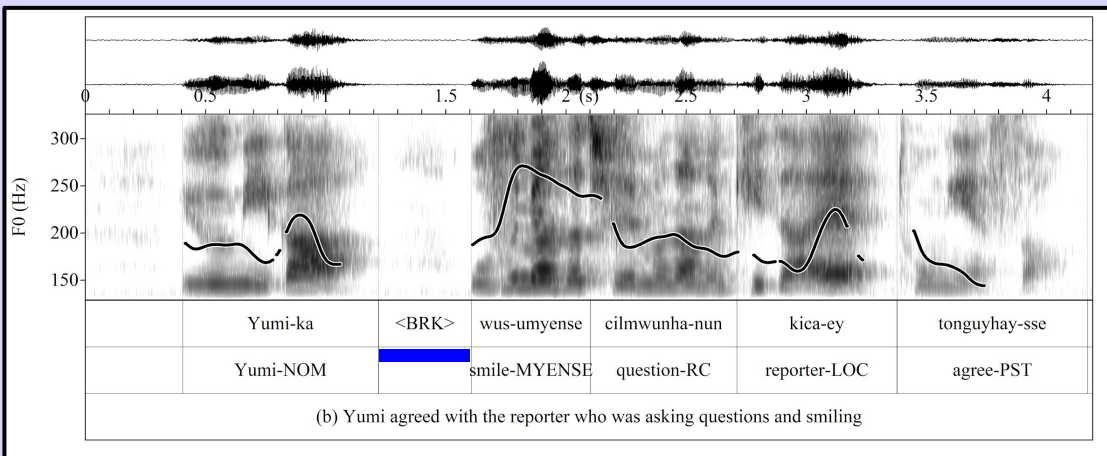
NB: Assumptions in
trees

Review of prosodic phrasing

(a) Yumi is smiling



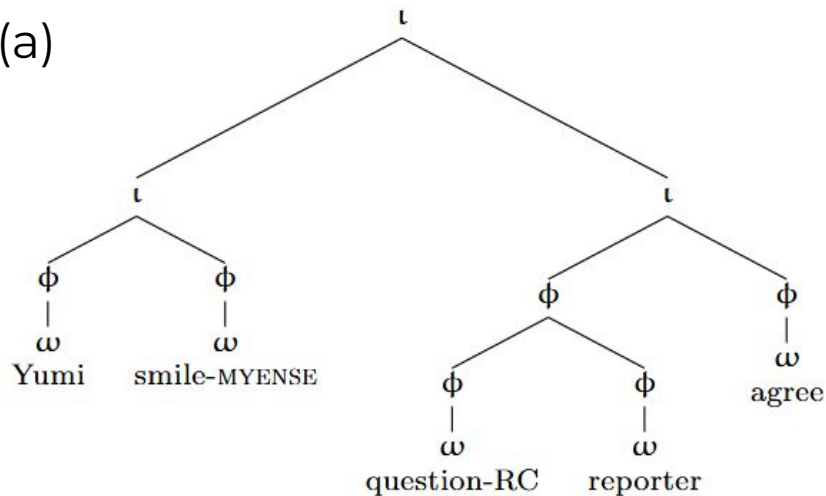
(b) The reporter is smiling



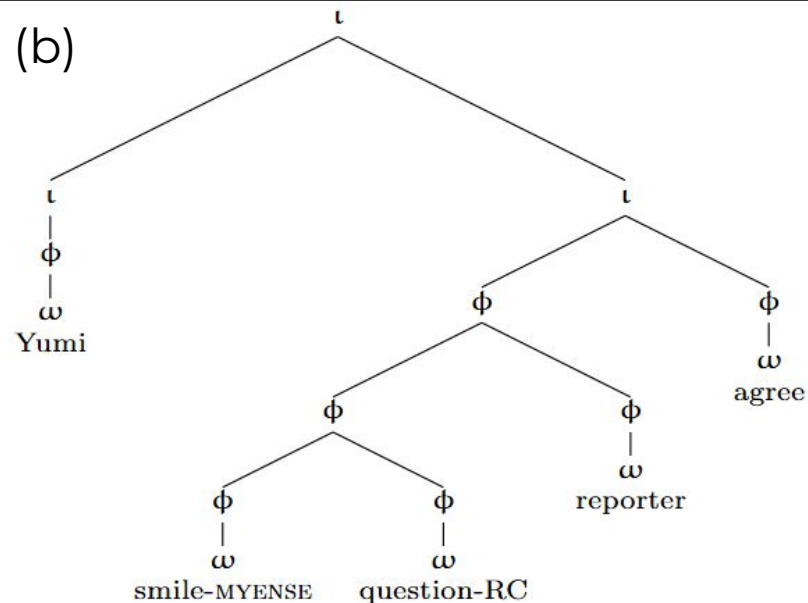
Output representations

(3) 유미가	웃으면서	질문하는	기자에	동의했어
Yumi-ka	wus-umyense	cilmwun-hanun	kica-ey	tonguyhay-sse
Yumi-NOM	smile-MYENSE	question-RC	reporter-LOC	agree-PST
a. Yumi, while smiling, agreed with the reporter who was asking questions				
b. Yumi agreed with the reporter who was asking questions and smiling				
(adapted from Kang & Speer 2005:246, ex. (4))				

(a)



(b)



Analysis - short version

(13) MATCH(CP, ι): a clause in the syntax must match to an ι in the prosodic representation

✗ Wrong predictions

(14) a. Align-L(CP, ι): The left edge of a CP in the input syntactic representation must correspond to the left edge of an ι in the output phonological representation.

✓ Correct predictions

b. Align-R(CP, ι): The right edge of a CP in the input syntactic representation must correspond to the right edge of an ι in the output phonological representation.

iff Align-L(CP, ι) >> Align-R(CP, ι)

Analysis - constraints

- a. Layeredness: Assign one violation mark for every prosodic constituent whose daughter is higher on the Prosodic Hierarchy than its parent constituent: $*\kappa_n$ dominating κ_{n+1} (Selkirk 1996)
- b. StrongStart: Assign one violation mark for every prosodic constituent whose leftmost daughter is lower in the Prosodic Hierarchy than its sister constituent immediately to its right: $*(\kappa_n \kappa_{n+1} \dots)$ (Elfner 2012:157)
- c. Align-L(CP, ι): For every CP in the syntactic representation, there is an ι in the output phonological representation such that the left edge of the CP coincides with the left edge of ι .
- d. Align-L(ι , CP): For every ι in the output phonological representation, there is a CP in the syntactic representation such that the left edge of the ι coincides with the left edge of the CP.
- e. Align-R(CP, ι): For every CP in the syntactic representation, there is an ι in the output phonological representation such that the right edge of the CP coincides with the right edge of ι .
- f. Align-R(ι , CP): For every ι in the output phonological representation, there is a CP in the syntactic representation such that the right edge of the ι coincides with the right edge of the CP.

Analysis - (a) Yumi smiling

Tableau 1: Analysis of (a) example

(a): Yumi smile-MYENSE CP[question-RC] reporter agree		LAYEREDNESS	STRONGSTART	ALIGN-L(CLAUSE, <i>t</i>)	ALIGN-L(<i>t</i> , CLAUSE)	ALIGN-R(CLAUSE, <i>t</i>)	ALIGN-R(<i>t</i> , CLAUSE)
a.					*	*	*
b.				*!	*	*	*

Analysis - (b) Reporter smiling

Tableau 2: Analysis of (b) example

(b): Yumi _{CP} [smile-MYENSE question-RC] reporter agree		LAYEREDNESS	STRONGSTART	ALIGN-L(CLAUSE, <i>ι</i>)	ALIGN-L(<i>ι</i> , CLAUSE)	ALIGN-R(CLAUSE, <i>ι</i>)	ALIGN-R(<i>ι</i> , CLAUSE)
a.	<pre> graph TD t1[ι] --- t2[ι] t1 --- t3[ι] t2 --- phi1[φ] t2 --- phi2[φ] phi1 --- w1[ω] w1 --- Yumi phi2 --- w2[ω] w2 --- smile[smile-MYENSE] t3 --- phi3[φ] phi3 --- phi4[φ] phi3 --- phi5[φ] phi4 --- w3[ω] w3 --- question[question-RC] phi5 --- w4[ω] w4 --- reporter phi5 --- w5[ω] w5 --- agree </pre>			*!	*	*	*
b. $\mathbb{R}^*$	<pre> graph TD t1[ι] --- t2[ι] t1 --- t3[ι] t2 --- phi1[φ] phi1 --- w1[ω] w1 --- Yumi t3 --- phi2[φ] phi2 --- phi3[φ] phi2 --- phi4[φ] phi3 --- w2[ω] w2 --- smile[smile-MYENSE] phi4 --- w3[ω] w3 --- question[question-RC] phi4 --- w4[ω] w4 --- reporter phi4 --- w5[ω] w5 --- agree </pre>				*	*	*

Analysis - (a) Yumi smiling, via Match

Tableau 3: Analysis of (a) example via Match

→ Wrong predictions without a putative higher-ranked markedness constraint X, identity of which is unknown

(a): Yumi smile-MYENSE CP[question-RC] reporter agree		LAYEREDNESS	STRONGSTART	X	MATCH(CLAUSE, ι)	MATCH(ι , CLAUSE)
a.					*	*
b.				*!	*	*

04

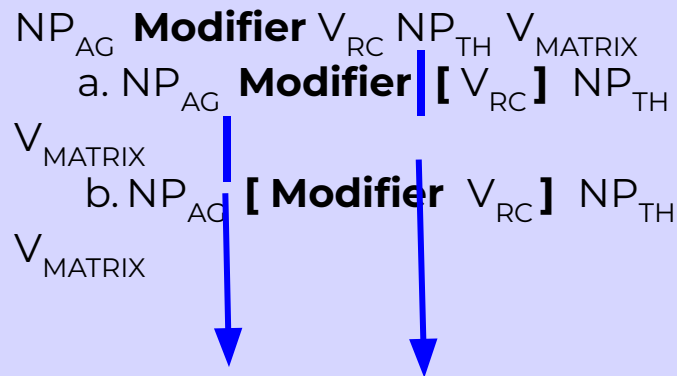
Discussion

Theoretical implications

- Privileging of one CP edge (= left) over the other in the mapping of ι
- Inconsistent with the dual-edged approach of Match
 - Typically considered to make the same predictions as Align
- Suggests a need for edge-based constraints with respect to ι -mapping (Ito & Mester 2019)
- Part of an ongoing stream of research looking into Match's "Asymmetry Problem"
 - See Ishihara & Myrberg (2023) for ι -mapping in Stockholm Swedish (right edge is privileged); Bellik et al. (2022) for φ -mapping in Japanese (left edge is privileged)

Puzzle

In ambiguous forms:

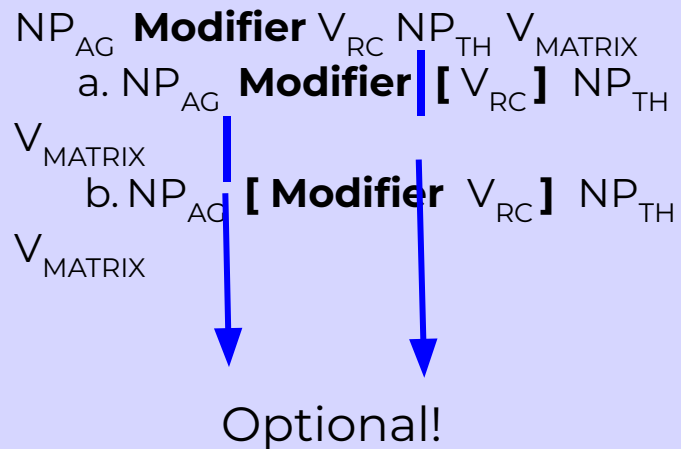


Obligatory

- If removed: ambiguous
- If position changed: other reading

Puzzle

In unambiguous forms:



Optionality of boundaries

Optionality of t-boundaries before the embedded predicate in unambiguous forms (cf. ambiguous (a) examples))

(15) 민규가 장난감을 말하는 친구에게 줬어
Minkyu-ka cangnankam-ul (BRK) malha-nun chinkwu-eykey cwe-sse
Minkyu-NOM toy-ACC talk-RC friend-DAT give-PST
Minkyu gave a toy to his friend who was talking

(16) 민규가 운동장으로 좋아하는 친구랑 갔어
Minkyu-ka wuntongcang-ulo (BRK) cohaha-nun chinkwu-lang ka-sse
Minkyu-NOM playground-INSTR like-RC friend-with go-PST
Minkyu went to the playground with the friend he likes

Optionality of boundaries

Optionality of ι -boundaries after the initial NP in unambiguous forms (cf. ambiguous (b) examples))

- (17) 유미가 어제 질문했던 기자를 옹호할거야
Yumi-ka (BRK) ecey cilmwunha-yss-ten kica-lul onghoha-lkeya
Yumi-NOM yesterday ask.question-PST-IPFV reporter-ACC support-FUT
Yumi will support the reporter who asked questions yesterday
- (18) 유미가 경제에 대해 질문하는 기자에 동의했어
Yumi-ka (BRK) kyengcey-ey tayhay cilmwunha-nun kica-ey tonguyhay-sse
Yumi-NOM economics-LOC about ask.question-RC reporter-LOC agree-PST
Yumi agreed with the reporter asking questions about economics

Ambiguity with implausible reading

- (19) 엄마가 책을 읽으면서 자는 딸을 안아줬어
emma-ka chayk-ul ilk-umyense ca-nun ttal-ul ana-cwe-sse
mother-NOM book-ACC read-MYENSE sleep-RC daughter-ACC hug-give-PST
a. The mother, while reading a book, hugged her daughter who was sleeping
b. The mother hugged her daughter who was reading a book while (the daughter was) sleeping

- Same syntactic ambiguity as before, with one plausible reading
- Could have an ι-boundary following the *-myense* verb → optional
- Once two readings become available, the presence of ι-boundaries is obligatory

Thank you!

고마워요!

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