Empirical studies on prosodic correlates of information structure in a typological comparison

Graz Summer School, September, 2018

Intonation and word order, class4

Féry

Today and tomorrow

Typological comparison of some issues related to syntax-phonology-information structure interface

General questions:

a. Do all languages use the same prosodic means to express syntax and information structure?

The answer is definitely and unambiguously negative.

b. How do languages differ?

c. Can we nevertheless find a common property for the expression of focus?

d. Do intonation systems influence syntactic choices (are syntactic structures determined by prosody and intonation)?

Two parts:

1. Thursday: b. and c. Different strategies that languages use to express information structure: Focus as prominence vs. focus as alignment; dual focus in three languages
2. Friday: d. Discontinuous nominal phrases as an example of typological variation

Content

1. Prosodic realization of focus: Focus as prominence and Focus as alignment
2. Intermezzo
3. Dual focus in French, German and Mandarin Chinese

Content

1. **Focus as prominence and Focus as alignment**

2. Intermezzo

3. Empirical studies on how different languages implement prosody for information structure: dual focus in French, German and Mandarin Chinese

Focus

The (simplified) notions of information structure used here (see Michael's class):

• Focus is understood as the part of a sentence eliciting a set of alternatives relevant for the interpretation of discourse–for instance answering a wh-question (Krifka 2008, based on Rooth 1992). It adds new information to the Common Ground (Rooth, 1992, 2015; Krifka, 2008).

Several kinds of focus may be distinguished: information focus (answer to to a wh-question), selection focus (choice between two possible answers), correction focus (the suggested answer is wrong and needs to be corrected).

However, focus cannot be equated with newness because a selective focus can be discourse-given:

A: Do you ride a car or a bicycle?

B: I ride a $[\text{CAR}]_{\text{Focus/Given}}$

• Givenness characterizes the constituents which have been mentioned in the question, and are repeated in the answer.

Focus and prosodic alignment

In Germanic languages, focus is prosodically realized with prominence on the lexically stressed syllable of the focused word or on the so-called focus exponent of the focused expression.

(1) a. Sue visited [GRAZ]$_F$

b. [SUE]$_F$ visited Graz

The sentence (1a), with nuclear pitch accent on *Graz*, shows the default accentuation. It can answer all questions in (2).

(2)

Did Sue visit Vienna?	→	She visited [GRAZ]$_F$
What part of Austria did Sue visit?	→	She visited [GRAZ]$_F$
What did Sue do?	→	She [visited GRAZ]$_F$
What happened?	→	[Sue visited GRAZ]$_F$

The sentence in (1b) is a special case, that can only be used in the context of a narrow focus on the subject. It can only answer the question in (3).

(3) Who visited Graz? → [SUE]$_F$ visited Graz.

Focus and prosodic alignment

Languages differ a great deal in the way they express information structure with **prosody**, especially focus and givenness:

- Some languages mainly use *in situ* phonetic prominence, i.e. raising—and crucially lowering—of F0, as just shown for English.
- Other languages use local prominence but less so or in a different way than Germanic languages (see Zubizarreta 1998 for Spanish, Lambrecht 1994 for French, see also Hindi, Finnish).
- Some languages do not use any prosodic prominence in the form of pitch accents (see for instance Zerbian 2006 for Northern Sotho, a Bantu language, Fiedler et al. 2010 for Tchadic, Gur and Kwa languages).
- Some languages mainly change the phrasing, by adding or deleting prosodic phrases (Korean, Indian languages, Chichewa).
- In Cantonese and other Chinese languages, lexical tones cannot be manipulated and raising of F0 for focus may concern non-local pitch, for instance entire prosodic phrases (Φ-phrases).

Languages may involve syntax and/or morphology to a greater extent than Germanic languages for expressing information structure. In fact, from a typological perspective, *in situ* phonetic prominence, i.e. raising of F0, as found in the Germanic languages is not very common.

Prosodic realization of focus

An alternative to focus as **prominence**:

Focus as **alignment**

Focus universally tends to be aligned prosodically with the right or left edge of a prosodic domain. In alignment between a focused and a prosodic constituent, morpho-syntax is also involved, since edges of prosodic constituents often fall together with edges of syntactic constituents (Gussenhoven 1983, Chen 1987, Selkirk 1986, McCarthy & Prince 1993, Féry 2013 among many others). This is a form of *information packaging* (Chafe 1976).

Phrasing as processing is compatible with focus as alignment: processing chunks of discourse as chunks of information structure.

Prominence can accompany alignment (Truckenbrodt 1995, Büring 2010).

Importantly: focus alignment is a tendency that is often violated due to higher constraints, or restriction in the syntactic structure.

Experiment

Task ‘Anima’ elicited with the questionnaire QUIS of the SFB 632 in Potsdam

Procedure

Pictures presenting simple actions (involving an agent and a patient) are presented to the informant. The informant is instructed to observe the stimuli and memorize the details of the figures and the presented events. When s/he is ready, the stimuli are taken away.

The informant replies to questions relating to the presented stimuli. S/he is instructed to give full answers.

Datasets obtained by at least 16 native speakers

Experiment

Factors

Focused constituent: agent or patient

Focus type: new information focus (I), selective (S) or corrective focus (C)

Word order and/or prosodic properties

Stimulus: Picture of a man pushing a car in front of a well

Conditions:

I/Sbj: '[…] who is pushing the car?'

S/Sbj: '[…] is a woman or a man pushing the car?'

C/Sbj: '[…] is a woman pushing a car?'

I/Obj: '[…] what is the man pushing?'

S/Obj: '[…] is the man pushing a car or a bicycle?'

C/Obj: '[…] is the man pushing a bicycle?'

Experimental results: Focus in French

In French, subject focus is normally expressed with a cleft sentence. Object focus is realized with canonical word order.

Table 1. Word order in the experiment *Anima* for French

	SVO	Cleft	Passive
Focused subject (n = 14)	2	11	1
Focused object (n = 15)	15	–	–

Agent correction in French (cleft-sentence)

a. {Does a woman push the car?}

Non, ((c'est un homme$_F$)$_I$ (qui pousse la voiture)$_I$)$_I$

no it-is a man who pushes the car

'No, a man pushes the car.'

b. {Who pushes the man?}

(L'homme blanc est poussé par l'homme noir$_F$)$_I$

The.man white is pushed by the.man black

'The white man is pushed by the black man.'

Experimental results: Focus in Mandarin

Mandarin Chinese resembles French in preferring clefted subjects, but only in correction contexts

Agent correction

{{…} does a man hit that man?}

shi yi ge nv de zai da nei ge nan de.

be one CLF female DE DUR hit that CLF male DE

'It is a woman who is hitting that man.'

Word order in the experiment *Anima* for Chinese (word order)

	SVO	VO	Cleft
Agent new (n = 7)	6	–	1
Agent correction (n= 7)	1	–	6
Patient focus (n = 14)	12	2	–

Experimental results: Focus in Hungarian

Hungarian obligatorily places a focused constituent in the preverbal position, and this is the position where the main pitch accent is realized.

In object focus, the given subject was either preceding the object (and it was then topical) or the subject came after the verb and was deaccented.

Table 2. Word order in the experiment *Anima* for Hungarian

	SVO	SOV	OVS
Focused subject (n = 16)	16	–	–
Focused object (n = 14)	–	10	5

Patient correction in Hungarian (O_FVS)

{Did the man kick a table?}

Nem, (egy SZEKET_F rúgott fel a férfi)$_I$

no, a chair kicked PRT the man

'No, the man kicked a chair.'

Experimental results: Focus in German

In German, nearly only sentences with SVO word order were obtained (only one cleft was formed on a focused subject).

Nearly no use was made of free word order in this experiment. Instead prominence in situ was mainly used. The post-focal VP was realized with deaccented intonation (flat and low).

Word order is not changed in such short sentences, but postnuclear deaccenting happens

	SVO	Cleft
Agent new (n= 8)	8	–
Agent correction (n= 8)	7	1
Patient new (n= 8)	8	–
Patient correction (n= 8)	8	–

In a larger sample: SO is 100% valid

Experimental results: Focus in German

Agent focus in German (S_FVO)

{Is a woman cutting the watermelon?}
Nein, ((ein MANN$_F$)$_\Phi$ (schneidet die Melone)$_\Phi$)$_I$
no, a man cuts the melon
'No, a man is cutting the melon.'

{[…] who is hitting the man?} (new information on the agent)
((Die FRAU$_F$)$_\Phi$ (schlägt den Mann)$_\Phi$)$_I$
'The woman is hitting the man.'

Experimental results: Focus in German

Patient/Object is focused

Q: Tritt der Mann einen Tisch? (patient correction)
A: Nein er tritt einen STUHL

Q: […] was tritt der Mann? (new information on the patient)
A: Der Mann tritt einen STUHL

The prominence (the pitch accent associated with the focus) is right-aligned.
Deaccenting renders constituents metrically invisible.

This solves the puzzle of why only post-nuclear given material is deaccented, but not the pre-nuclear given ones.

Focus in Fon

Many African tone languages present an asymmetry in focus marking (Zerbian 2006, Fiedler et al. 2010): they mark focus on a subject, but not a focus on an object.

Fon (Kwa, Gbe), Aboh (2016), Schwarz & Fiedler (2007) and Fiedler et al. (2010) is a case of asymmetry in focus marking. The subject is sentence-initial, and when focused, it is obligatorily followed by the focus marker *wè*.

a. New agent (S_FVO)

{Who ate the beans?}

((nyɔ́nú$_F$ ɔ́ wɛ̀)$_Φ$ (ɖu àyìkún)$_Φ$)$_I$

woman DEF FM eat bean

'[the woman]$_F$ ate the beans.'

Focus in Fon

When the focus is right-aligned by default no morphological marker is needed: Object is usually not focus-marked.

b. New patient (SVO$_F$)

{What did the woman eat?}

((é dù àyìkún$_F$)$_Φ$)$_I$

3SG eat bean

'She ate [beans]$_F$'

But if the object is fronted, the object is optionally followed by *wè*.

c. New patient (O_FSV)

(([àyìkún$_F$ (wɛ̀)])$_Φ$ (é dù)$_Φ$)$_I$

bean (FM) 3SG eat

'She ate [beans]$_F$' ~ 'It is [beans]$_F$ that she ate.'

Assumption: the morphological marker wɛ̀ delimits a prosodic phrase at its right edge.

Focus in Mandarin Chinese

In Mandarin, lexical tones are not changed (except for sandhi tone changes that apply in prosodic domains, see M.Chen 2000).

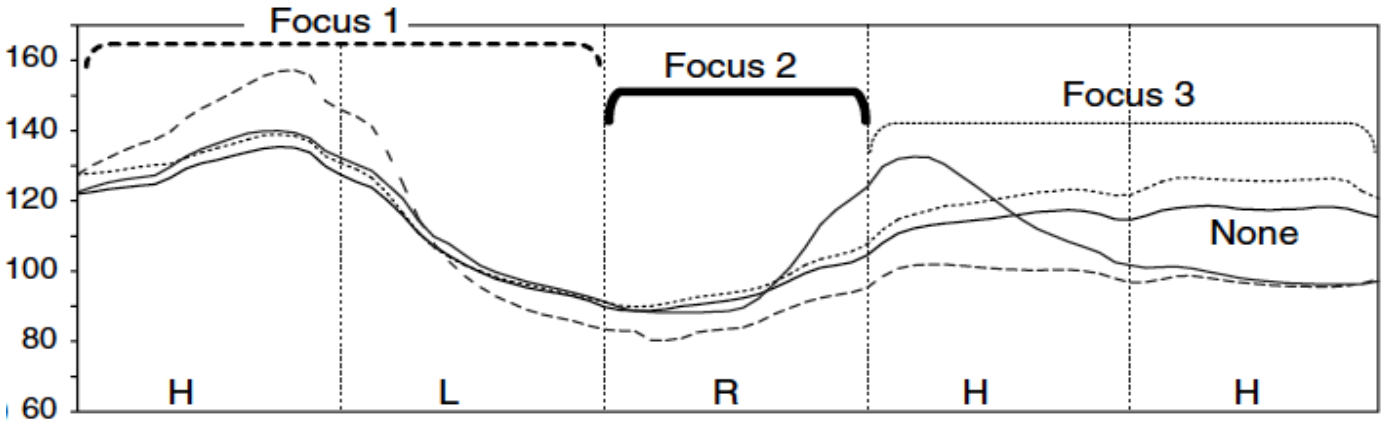
Focus leads to hyperarticulated phonemic features (Y.Chen & Gussenhoven 2008) and register changes (Xu 1999).

Mopho-syntactic correlates of information structure are preferred, like morphological markers, syntactic restructuring, deletion of given material, or no marking at all.

Focus in Mandarin Chinese

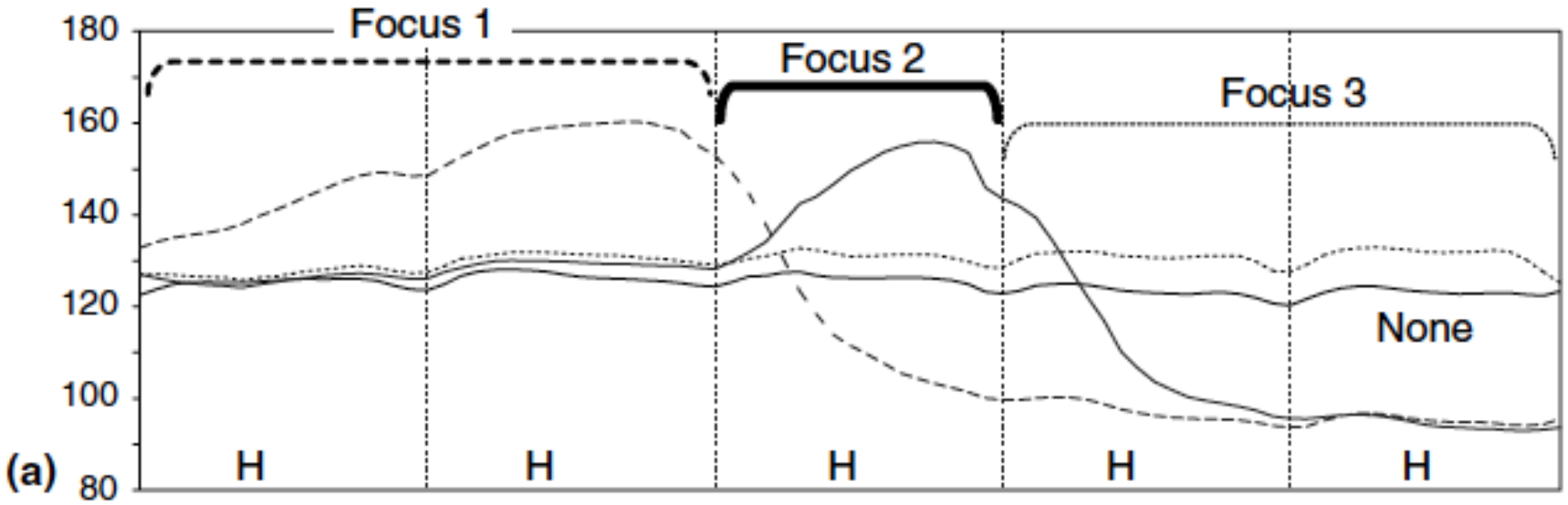
Phonetic correlates: In Mandarin, F0 variation due to lexical tones is implemented locally on syllables, while F0 variation due to focus is implemented globally on the whole sentence.

In Xu (1999) and Wang & Xu (2011), it is shown that the tonal contour is well preserved when it is under focus, although focus raises F0 of the focused word and lowers F0 post-focally. Wang, Xu & Ding (2018): No change in phrasing due to single focus.



The effect of focus in Mandarin in a sentence consisting of words with different tones : H, L, R, H, H (from Xu 2005:232)

Focus in Mandarin Chinese



Xu, Yi (2005: 232): the effect of focus and givenness on a sentence consisting of only H tones: post-focal compression in focus on the first or second constituent depending on the focus position. Other tones show less compression.

Prosodic correlate of focus in a phrase language: Tamil

Indo-Aryan and Dravidian are phrase languages, with tones delimiting prosodic phrases. These languages have similar intonational patterns: areal phenomenon

Keane (2014) recorded 24 school children (15-17 years old) while performing different tasks.

(p.118) “There are no lexical distinctions dependent on stress in Tamil, and native speakers (even those with phonetic training) do not have strong intuitions about the relative prominence of syllables within a word.”

Keane (2014:122): The basic building block of Tamil intonation is a rising contour, which typically occurs on each lexical word except for the last in a phrase.

Tamil

Keane (2014: 150) "intonational differences between broad and narrow focus readings may be minimal. In [Fig 1.27], the object *eɳɳeyai* bears a rising contour and is the only word to do so."

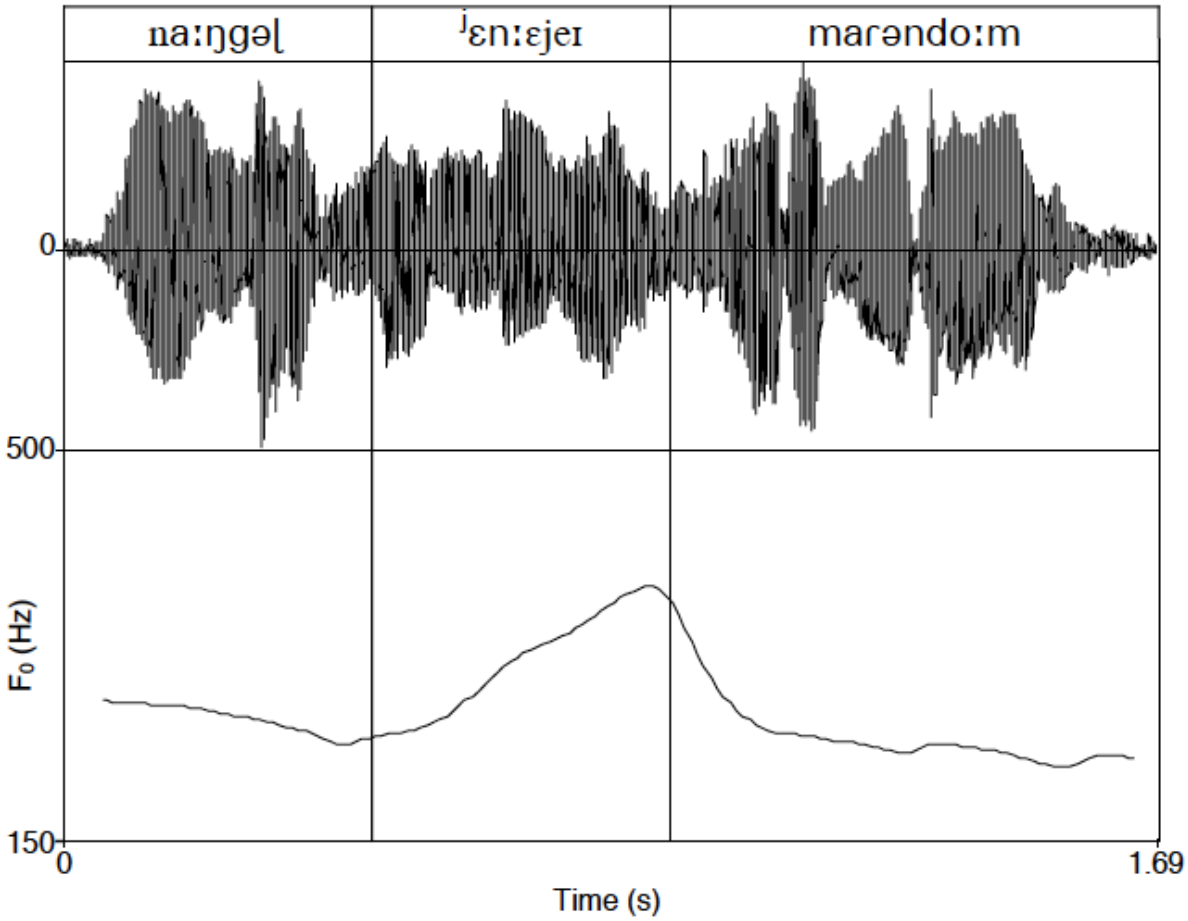


Fig. 1.27 Waveform and f_0 contour from female speaker SA for:
naaŋgaɭ eɳɳeyai marandoom
we oil.ACC forget.PST.1PL
'We forgot the oil.'

From Keane (2014:151):
“Intonational resources […] are limited: besides enforcing the presence of a rising contour on constituents that might otherwise lack one, manipulation of the relative scaling of f0 peaks appears to be the primary means of signalling semantic salience intonationally.”

A similar result was found for Hindi (Jyothi et. al. 2014).

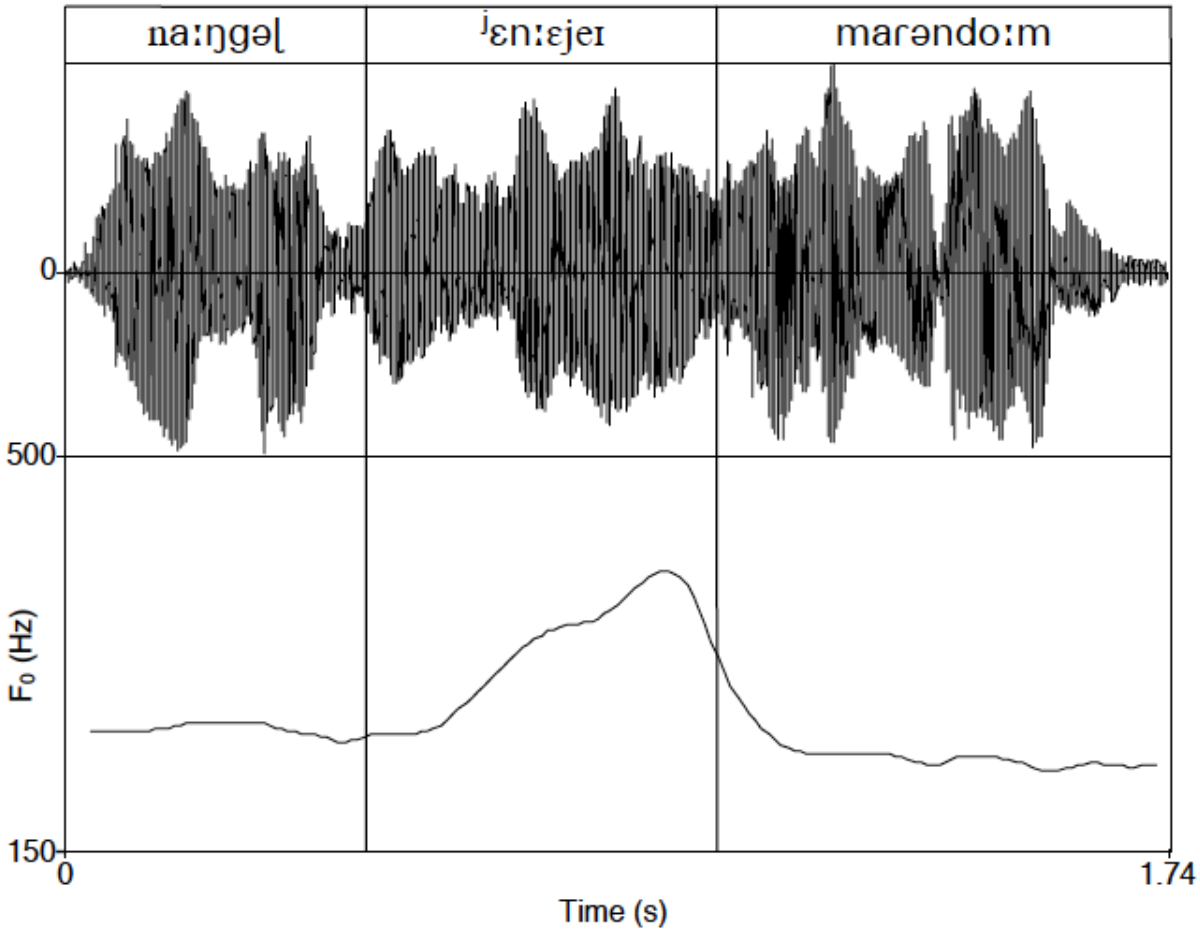


Fig. 1.28 Waveform and f_0 contour from female speaker SA for:
naaŋgaɭ **ɛɳɳeyai** marandoom
we oil.ACC forget.PST.1PL
‘We forgot **the oil**.’

If the subject
is focused,
a new prosodic
phrase is created.
The existing
phrases are
not suppressed.

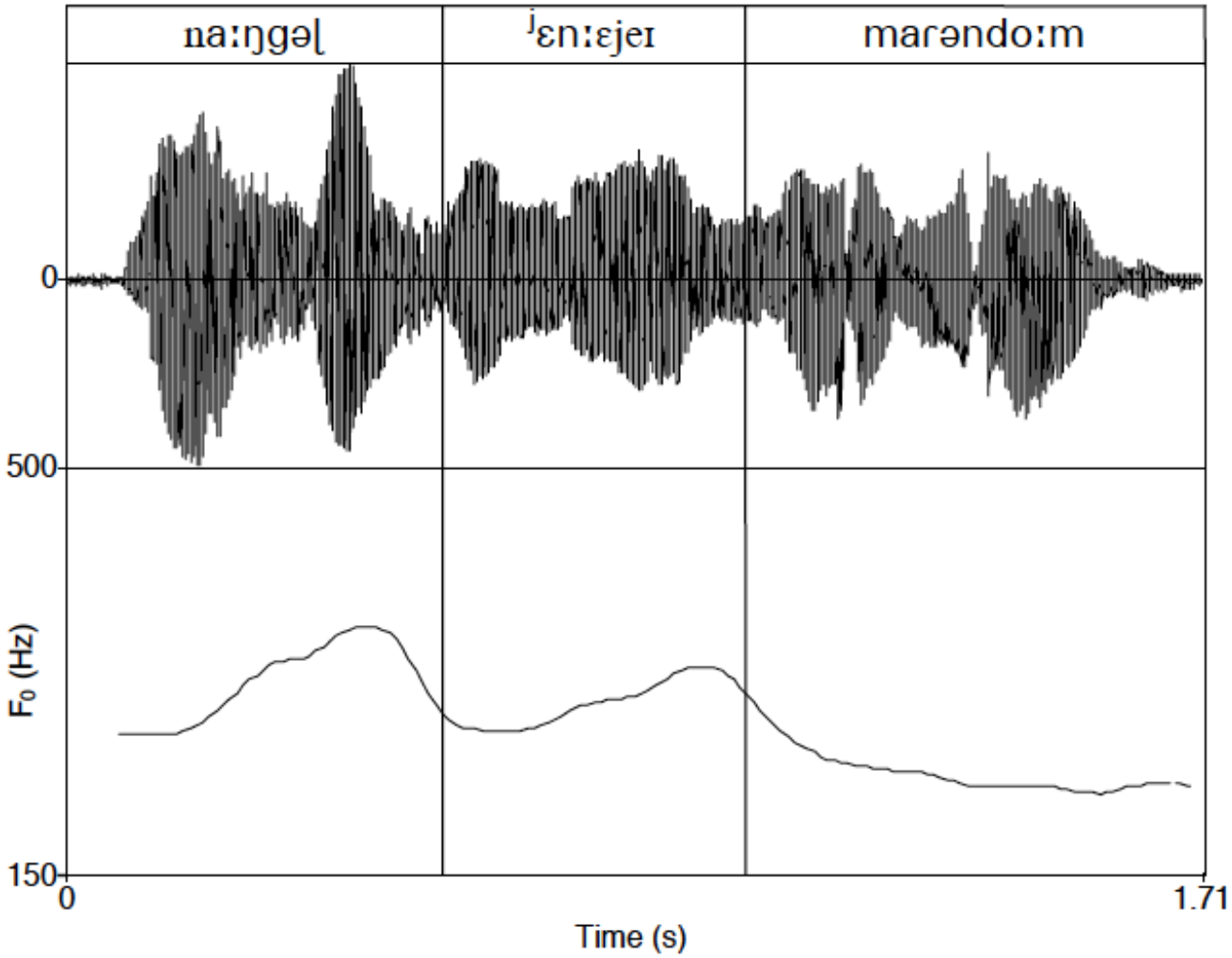


Fig. 1.29 Waveform and f_0 contour from female speaker SA for:

naaŋgaɭ eɳɳeyai marandoom
we oil.ACC forget.PST.1PL
'**We** forgot the oil.'

Focus and prosodic alignment

First interim summary

Languages achieve fulfillment of the align focus constraint in different ways (conspiracy).

Reordering of the constituents: Hungarian (Italian, Spanish, Georgian).
More radical change in the syntax (cleft): French, Chinese.
Deaccenting of postnuclear material: German, English (same results for Dutch, Greek).
Additions of morphemes (focus markers): Fon, Bole (also Cantonese).
Insertion of prosodic boundaries and/or phrases: Hindi, Tamil

The need for prosodic alignment can be countered by constraints in syntax. Alignment is not always perfect, it is a tendency.

Content

1. Focus as prominence and Focus as alignment

2. Intermezzo

3. Empirical studies on how different languages implement prosody for information structure: dual focus in French, German and Mandarin Chinese

Intermezzo

• French has prosodic prominence, but not in the form of pitch accents like German or English. The prominent tones that French uses are not assigned to the lexical stress of a word because French does not have lexical stress. Rather French uses phrasal tones, assigned to a prosodic phrases.

• Examples are from laboratory production experiments on dual focus to be reported shortly: Native speakers of German and native speakers of French uttered sentences set in different information structural contexts: all-new, single focus (initial and final) and dual focus.

German

a. All-new: Was war heute mittag los? ‘What happened today for lunch?‘
[Mein Onkel hat heute mittag Nudeln gekocht]$_F$
My uncle has today noon noodles cooked
[My uncle cooked noodles for lunch]$_F$

b. Initial focus: Wer hat heute mittag Nudeln gekocht? ‘Who cooked noodles for lunch?’
[Mein Onkel]$_F$ hat heute mittag Nudeln gekocht
[My uncle]$_F$ cooked noodles for lunch

c. Final focus: Was hat dein Onkel heute Mittag gekocht? ‘What did y. u. cook for lunch?’
Mein Onkel hat heute mittag [Nudeln]$_F$ gekocht
My uncle cooked [noodles]$_F$ for lunch

d. Dual focus: Wer hat heute mittag was gekocht? ‘Who cooked what for lunch?’
[Mein Onkel]$_F$ hat heute mittag [Nudeln]$_F$ gekocht
[My uncle]$_F$ cooked [noodles]$_F$ for lunch

German

a. All-new: Was war los? ‘What happened?”
[Der kolumbianische Gärtner hat Rosen gesucht]$_F$
[The Columbian gardener looked for roses]$_F$

b. Initial focus: Welcher von den Gärtnern hat Rosen gesucht?
[Der kolumbianische]$_F$ Gärtner hat Rosen gesucht
[The Columbian]$_F$ gardener looked for roses

c. Final focus: Was hat der kolumbianische Gärtner gesucht?
Der kolumbianische Gärtner hat [Rosen]$_F$ gesucht
The Columbian gardener looked for [roses]$_F$

d. Dual focus: Welcher von den Gärtnern hat was gesucht? (dual focus)
‘Which one of the gardeners has what looked for?’
[Der kolumbianische]$_F$ Gärtner hat [Rosen]$_F$ gesucht
[The Columbian]$_F$ gardener looked for [roses]$_F$

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[The Columbian]$_F$ gardener looked for roses

c. Final focus: Was hat der kolumbianische Gärtner gesucht?
Der kolumbianische Gärtner hat [Rosen]$_F$ gesucht
The Columbian gardener looked for [roses]$_F$

d. Dual focus: Welcher von den Gärtnern hat was gesucht? (dual focus)
‘Which one of the gardeners has what looked for?’
[Der kolumbianische]$_F$ Gärtner hat [Rosen]$_F$ gesucht
[The Columbian]$_F$ gardener looked for [roses]$_F$

Final F Initial F Dual F All-new

French

Similar examples in French, except for the fact that the two foci are both post-verbal objects:

Bernadette a présenté [son collègue] [à leur rival].
'*Bernadette introduced her colleague to their rival.*'

All-focus (AF): *'What happened?'* 

Initial focus (IF): *'Who did Bernadette introduce to their rival?'* 

Final focus (FF): *'To whom did Bernadette introduce her colleague?'* 

Dual focus (DF): *'Who did Bernadette introduce and to whom?'* 

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Dual Initial All-new Final

Second interim conclusion

There is not one strategy in French to assign more prominence to a constituent, like in German or English, rendering French prosodic response to changes in information structure more difficult to describe.

French prosody does not use increase of F0 on specific syllables, and thus differs form Germanic languages more than is usually assumed in the literature on the subject. French uses phrasal tones that are aligned with specific locations of the prosodic phrase.

Neither phonologists nor semanticists can reconstruct the intended focus structure of the sentences I played just by listening to them.

French speakers use different strategies to express focus: cleft sentences, ellipsis … but not pitch accent in situ.

Important for a semantic interpretation of prosody.

Content

1. Focus as prominence and Focus as alignment

2. Intermezzo

3. Empirical studies on how different languages implement prosody for information structure: dual focus in French, German and Mandarin Chinese

Dual focus

- Three typologically different languages are compared with respect to the way they realise focus, and more specifically dual focus in a phonological and phonetic comparison.

Mandarin is a tone language: register changes according to focus structure, lexical tones and no pitch accent.

German is an intonation language with lexical stress and pitch accents that can be more or less prominent according to focus-givenness structure.

French does not have lexical stress. It uses phrasing and phrasal tones more than pitch accents. It is a phrase language.

- An example of dual focus (two foci are present in one sentence):

  A: Who bought a jacket for whom?

  B: *[Mary]$_F$ bought a jacket for [John]$_F$*

The results for dual focus are compared with other types of focus: all-new, single initial and single final focus, thus four focus conditions in each language.

Empirical study

Dual focus elicits a conflict between the need to include the entire sentence in a single intonation phrase (ɪ-phrase) and the need to divide the sentence in two ɪ-phrases, one for each focus, according to the Culminativity Principle (see Kabagema-Bilan, López-Jiménez & Truckenbrodt, 2011 for an explicit formulation of the conflict for Mandarin).

Culminativity Principle (adapted from Hyman 2006)

> A prosodic domain (prosodic word, prosodic phrase, and intonation phrase) has a unique head reflected as a metrical prominence. This head attracts the main accent/prominence in its domain.

- Is Culminativity a universal principle?
- Does it apply in the same way in all three languages examined here?

Does dual focus add up to "Initial focus + Final focus", or does it rather have its own realization?

Metrical structure of dual-focus in German

What about the effect of dual focus on the metrical structure and on phrasing?

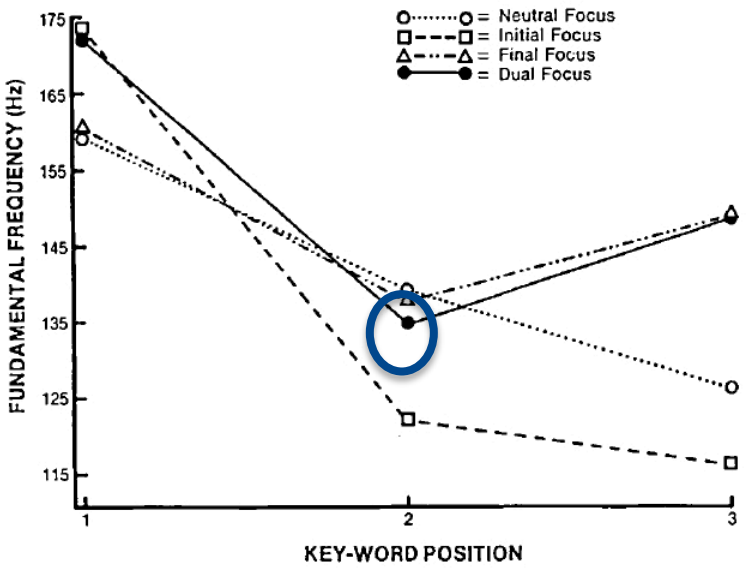
× ?				×		ι-phrase
×			x	×		Φ-phrase
×	×	×	×	×	×	ω-word

[(Der brasilianische$_F$ Lehrer)$_\Phi$ (hat heute morgen)$_\Phi$ (Mali$_F$ gelobt)$_\Phi$]$_\iota$ DF

The Brazilian teacher has today morning Mali praised

Dual focus realization in English

- Early investigations for English by Eady, Cooper, Klouda, Mueller & Lotts (1986) suggest that dual focus imperfectly combines correlates of initial and of final focus.
- The first focus is equivalent to a single initial focus. The second focus has an influence on the post-focus region of the first focus.
- No post-focus compression was found after the first focus in dual-focus sentences.



Eady & Cooper, 1986

{Who shot the puck to Kent?}
Don shot the puck to Kent.
1 2 3

Theoretical results of the studies

Results of the investigation:

1. If we assume that both foci should be equally prominent in prosody, and that each of them should be the head of their own prosodic phrase, Culminativity is violable in all three languages.
2. Culminativity does not have the same effect in all three languages.
3. Syntax-based phrasing is prevalent in all three languages. Only in German is phrasing affected by dual focus
4. There is an effect of length on prosodic phrasing.
5. Information structure is important for syntax-phonology interface; it does affect phrasing.

Production experiment in Mandarin
Joint work with Bei Wang

• Five speakers of Beijing Mandarin were recorded, while answering questions eliciting different focus structures on sentences varying in length.

• The experimenter, a female native speaker (Bei Wang), tested the speakers individually. Three manipulated factors were

• focus conditions: *all-new* (Neutral), *initial focus* (Initial), *final focus* (Final), *dual focus* (Dual)

• sentence length: short (6 syllables), long (12 syllables)

• lexical tone: all four tones

• The total number of utterances for each speaker is 2 (sentence length) × 4 (focus conditions) × 5 (tone combinations) × 2 (repetitions) = 80 (utterances), thus 400 sentences altogether.

Mandarin

The material included dual focus on the subject and on the post-verbal argument.

Table I. Examples of short and long sentences used as reading material

	Experimental sentences
Short	WangYing can.guan che.jian.
	Wang Ying visit workshop.
	'Wang Ying visited the workshop.
Long	Wang.Ying can.guan Shan.Xi Qing.Xiang yi.jie che.jian.
	Wang.Ying visit Shan.Xi Qing.Xiang first.street factory.
	'Wang Ying visited the Shan.Xi Qing.Xiang first-street workshop.'

Mandarin

Table II. Examples of background questions

Focus condition	Background questions
Initial focus	shui can.guan che.jian?/shui can.guan Shan Xi Qing Xiang yi jie che.jian? (Who visited the workshop?/Who visited the Shan.Xi Qing.Xiang first-street workshop?)
Final focus	Wang Ying can.guan shen.me?/Wang Ying can.guan Shan.Xi Qing.Xiang yi jie shen.me? (What did Wang Ying visit?/ What did Wang Ying visit at Shan.Xi Qing.Xiang first-street?)
Dual focus	shui can.guan shen.me?/ Shui can.guan Shan.Xi Qing.Xiang yi jie shen.me? (Who visited what?/Who visited some place at Shan.Xi Qing.Xiang first-street, and what was that?)
Neutral	Shen.men shi? (What happened?)

Production experiment in German (Joint work with Bei Wang, Beijing)

- Six female speakers of Standard German were recorded in Frankfurt, while answering questions eliciting different focus structures on sentences varying in length.

- Subjects and pre-verbal arguments (German is a verb-final language).

- The experimenter, a female German native speaker, tested the speakers individually.

- Altogether, there were 5 lexicalizations × 4 lengths × 4 focus conditions × 2 repetitions × 6 speakers = 960 sentences for analysis.

Example of experimental material

A. [(**Der L<u>EH</u>rer)**$_{\Phi}$ (lobt **M<u>A</u>li)**$_{\Phi}$]$_{I}$
'The teacher praised Mali.'

B. [(**Der L<u>EH</u>r**er)$_{\Phi}$ (hat **heute morgen M<u>A</u>li** gelobt)$_{\Phi}$]$_{I}$
'The teacher praised Mali this morning.'

C. [(**Der brasi<u>LIA</u>nische Lehrer)**$_{\Phi}$ (hat **M<u>A</u>li** gelobt)$_{\Phi}$]$_{I}$
'The Brazilian teacher praised Mali.'

D. [(**Der brasi<u>LIA</u>nische Lehrer)**$_{\Phi}$ (hat **heute morgen M<u>A</u>li** gelobt)$_{\Phi}$]$_{I}$
'The Brazilian teacher praised Mali this morning.'

Production experiment in French (joint work with Emilie Destruel, Iowa)

- 16 female speakers of Standard French were recorded, while answering questions eliciting different focus structures on sentences. Each speaker produced half of the total material.

- The experimenter, a female French native speaker (Emilie Destruel), tested the speakers individually.

- We tested post-verbal constituents.

Sample material: Target sentences

Two post-verbal objects

short: Bernadette a présenté **[son collègue] [à leur rival]**.

‘*Bernadette introduced her colleague to their rival.’*

long: Bernadette a présenté **[son collègue américain] [à ma belle-soeur canadienne]**.

‘*Bernadette introduced her American colleague to my Canadian sister-in-law.’*

Two post-verbal adjuncts

short: Bernadette l’a présenté **[dans le couloir] [pendant la pause]**.

‘*Bernadette introduced him in the hallway during the break.’*

long: Bernadette l’a présenté **[dans la salle de réunion] [pendant le dîner d’adieu]**.

‘*Bernadette introduced him in the conference room during the farewell dinner.’*

Sample material: Focus-triggering questions

Questions for one (out of four) target sentence with two short objects

Bernadette a présenté ***[son collègue] [à leur rival]****.*
'Bernadette introduced her colleague to their rival.'

All-focus (AF): *'What happened?'*
Initial focus (IF): *'Who did Bernadette introduce to their rival?'*
Final focus (FF): *'To whom did Bernadette introduce her colleague?'*
Dual focus (DF): *'Who did Bernadette introduce and to whom?'*

Design

The targets (post-verbal objects or adjuncts) varied in length: they were either short (3/4 syllables) or long (7/8 syllables)

Four focus conditions triggered by the question in the dialogue:
All-new (AF), Initial (IF) Final (FF) or Dual (DF)

We created four lexicalizations.

Altogether: 4 lexicalizations, 4 lengths, 4 focus conditions = 512 sentences

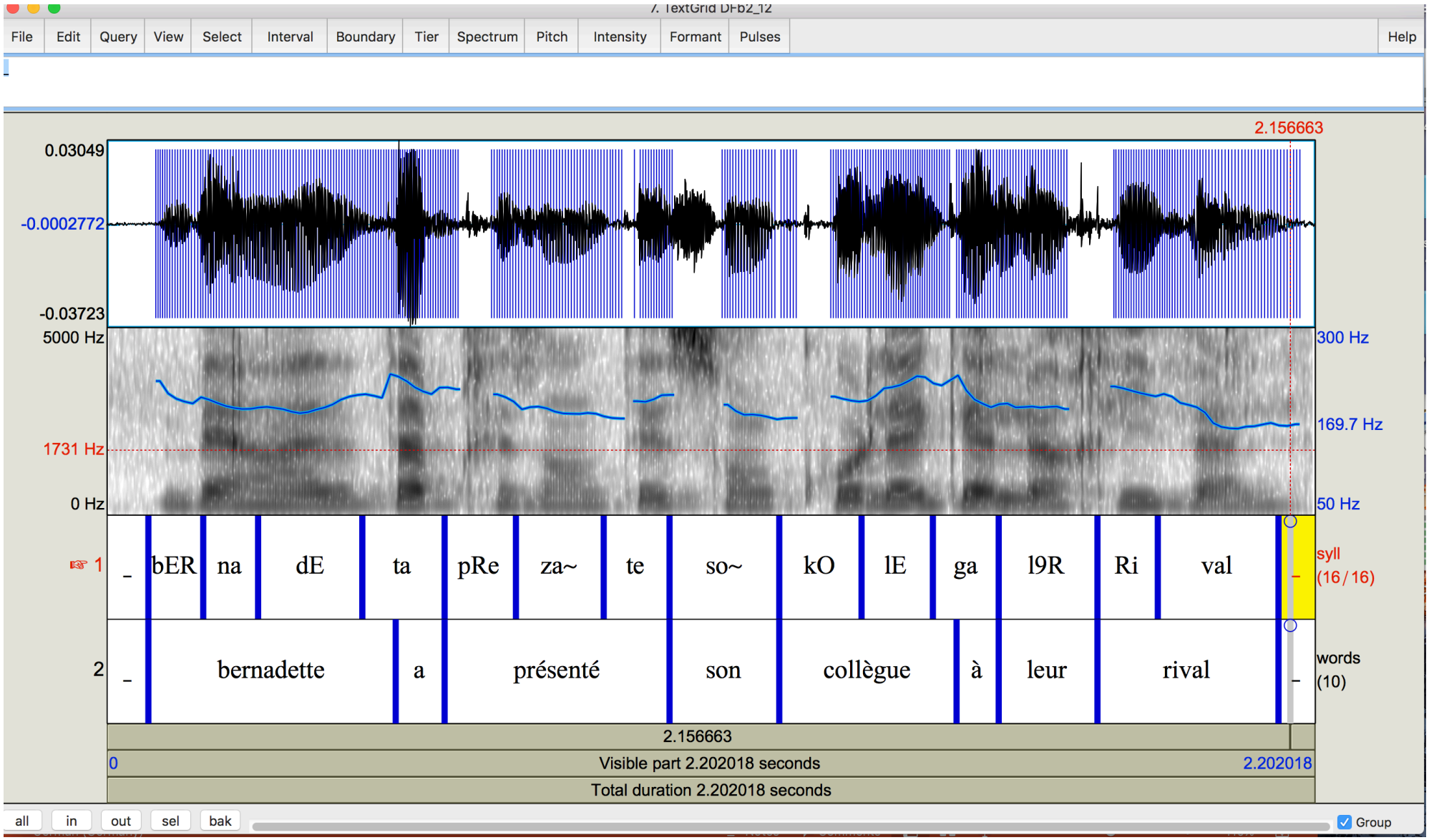
Phonetic analysis for all three languages

For each sentence, syllable boundaries were first automatically inserted with the help of EasyAlign in Praat, and were manually corrected.

Ten time-normalized F0 points were subtracted for each syllable with the Praat script ProsodyPro (Xu, 2005-2012), and then averaged across speakers.

Results of ProsodyPro:

Averaged and time-normalized F0 contour for all speakers in all conditions. This allows a direct comparison of all normalized F0 contours.


7: TextGrid DFb2_12
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0.03049
-0.0002772
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5000 Hz
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0 Hz
300 Hz
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1
_ bER na dE ta pRe za~ te so~ kO lE ga l9R Ri val _
syll
(16 / 16)
2
_ bernadette a présenté son collègue à leur rival _
words
(10)
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Total duration 2.202018 seconds
all in out sel bak
Group

Prosodic reflexes

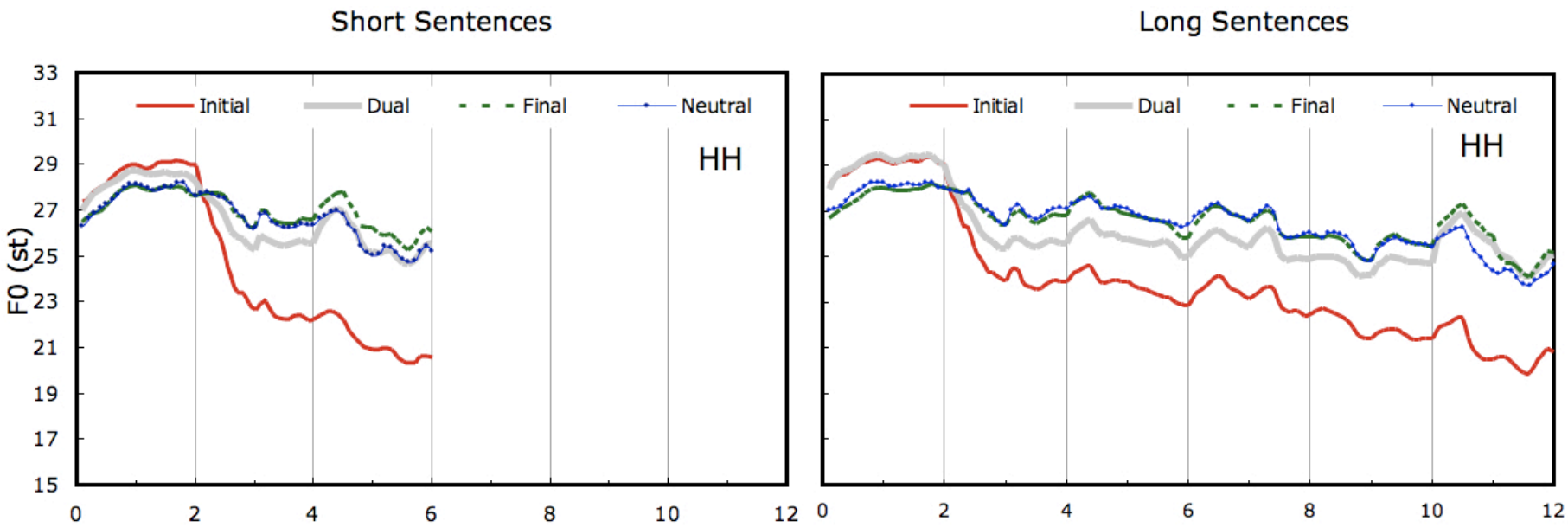
Natural languages employ a variety of prosodic resources to mark focus:

- Pitch accent placement/deaccentuation
- Register (F0) changes
- Changes in phrasing reflected by phrasal tones, boundary tones
- Other phonetic features: duration, intensity

What do German, Mandarin and French, do when confronted with a dual focus? What prosodic resources do they use? Do they all use the same ones? Do they resemble the ones used in single foci?

Results and analysis

Dual-focus realization in Mandarin



• The findings of dual-focus intonation in Mandarin Chinese are similar to those in English: First focus of a dual focus is similar in F0 to single initial focus and second focus of dual focus is similar to single final focus. No change in phrasing due to focus.
• Lack of complete post-focus compression after the first focus is not due to time pressure between the two foci: it is found both in short and in long sentences.
• Duration increase in both foci, comparable to corresponding single foci.

• As for the perception of focus, the hit rate in the dual focus condition was much lower than that of the initial focus condition, a result likely due to the lack of post-focus compression in dual focus sentences. (Wang & Féry 2015)

Dual-focus realization in Mandarin

• Our results falsify those of Kabagema-Bilan et al. For Mandarin who found that the second focus showed higher F0, longer duration and post-focus F0 lowering, whereas the first focus did not show any phonetic variation.

According to them, the phonetic effects on the second focus are triggered by the fact that this focus carries the sentence accent, and thus the highest prominence in the intonational phrase.

They find that Culminativity is preserved in Mandarin, while we find that it is violated: In our analysis, both foci are realized in one i-phrase and both foci are equally prominent.

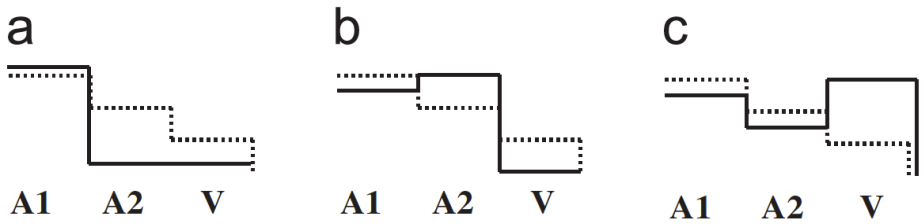
Background on German prosody

Phonetic correlates of single focus are well-studied in German: F0 raising, post-focal F0 compression and lengthening on the focused word. See Grabe, 1998; Baumann, Becker, Grice & Mücke, 2007; Braun, 2004; Féry & Kügler, 2008 among others.

Prosodic structure (syntax-prosody mapping) is not necessarily affected by focus. In a sequence of two arguments and a verb, focus boosts the pitch accent on the focus and triggers post-focal compression:

weil der Hummer den Hammel eingeladen hat
'because the lobster invited the sheep.'

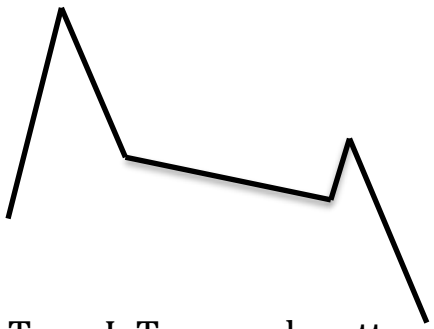
The dotted line shows an all-new realization: all constituents are in a downstep relation:



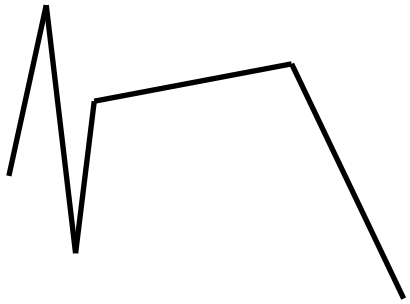
Dual-focus realization in German

Results of the experiment: Three types of dual focus (from Wang & Féry 2018):

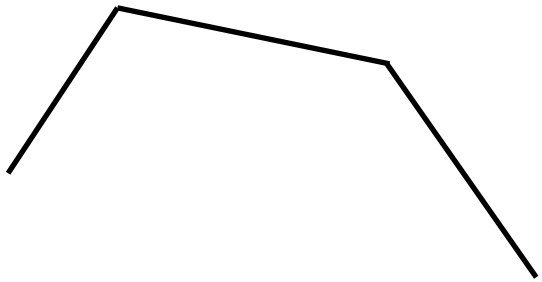
- Two-peak pattern in one intonational phrase (Type I) is the most frequent type (57.8%): a falling tone on both focused words, and compressed and lowered pitch in-between.
- Two-phrase pattern (Type II) is less frequent (23.5%). When the subject NP is longer, a boundary tone is inserted more often than when the subject is short.
- Hat-pattern (Type III) is nearly only found in short sentences (18.7%). This pattern is equivalent to sentences with a single focus.



Type I. Two-peak pattern
First focus: falling realization

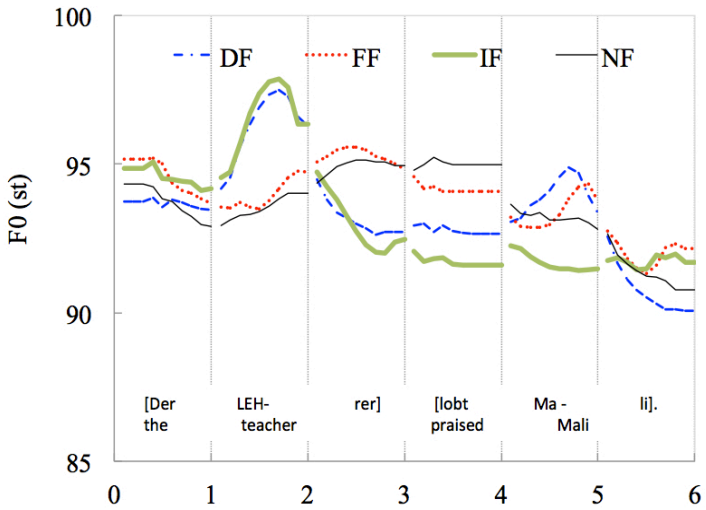


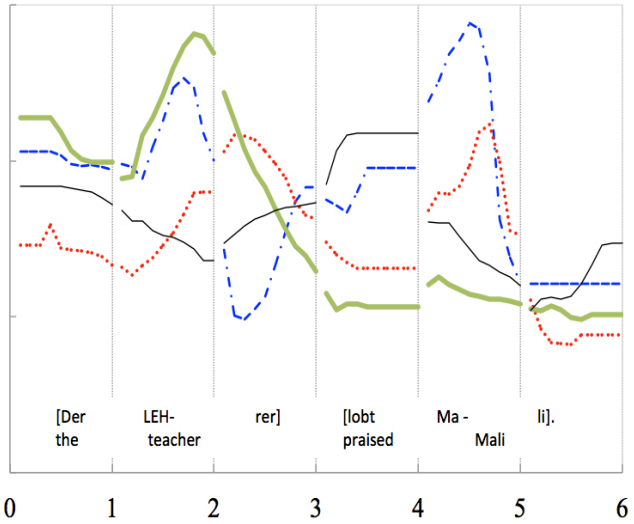
Type II. Two-phrase pattern
First focus: falling-rising realization

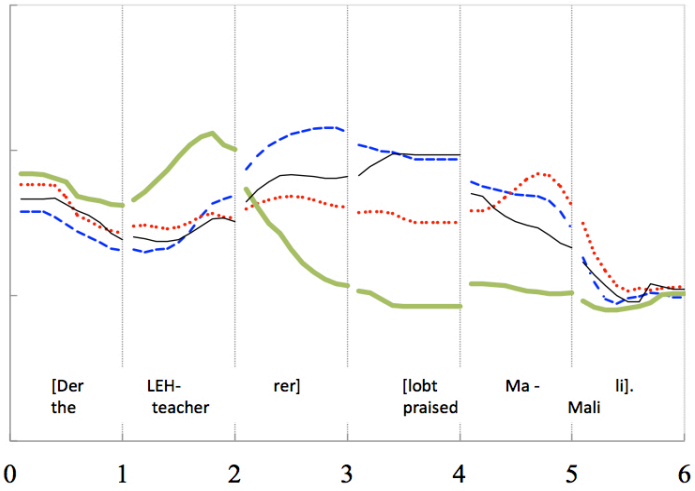


Type III. Hat-pattern
First focus: rising realization

short subject + short VP







Dual-focus realization in German

Type I (two-peak pattern) shows that Culminativity can be violated in a sentence containing a dual focus in German.

Type II (two-phrase pattern) may be understood as a kind of repair. Each focus is in a separate phrase.

Type III (hat pattern) does not realize the two foci as equally prominent.

	Two-peak	Two-phrase	Hat-pattern
A (short+short)	16 (27.1%)	9 (15.3%)	34 (57.6%)
B (short+long)	35 (59.3%)	15 (25.4%)	9 (15.3%)
C (long+short)	38 (69.1%)	17 (30.1%)	-
D (long+long)	44 (77.2%)	13 (22.8%)	-
Total	133 (57.8%)	54 (23.5%)	43 (18.7%)

Background on French prosody

in a production study with sentences containing single focus, Destruel & Féry (to appear) found differences in the F0 contour and phrasing of post-verbal given objects and adjuncts.

- Larger F0 raising and a longer duration at the end of the verb when an adjunct is following the verb (boundary tone on the verb).
- More F0 compression and shorter duration in the adjunct phrase itself. The compression is smaller than in Germanic.
- Our conclusion: Objects have the tendency to be (more) phrased together with the verb, adjuncts to be (more) phrased separately.

Dual focus realization in French

Based on our previous work on French, research questions specifically for Dual Focus:

- Do we find the same difference between phrasing of objects and adjuncts?
- Are the correlates of dual focus a combination of Initial Focus and Final Focus, like in English and Mandarin Chinese?
- What about individual variation?

Dual focus realization in French

Facts are more complicated in French than in other languages, partly because of the different strategies used by the speakers:

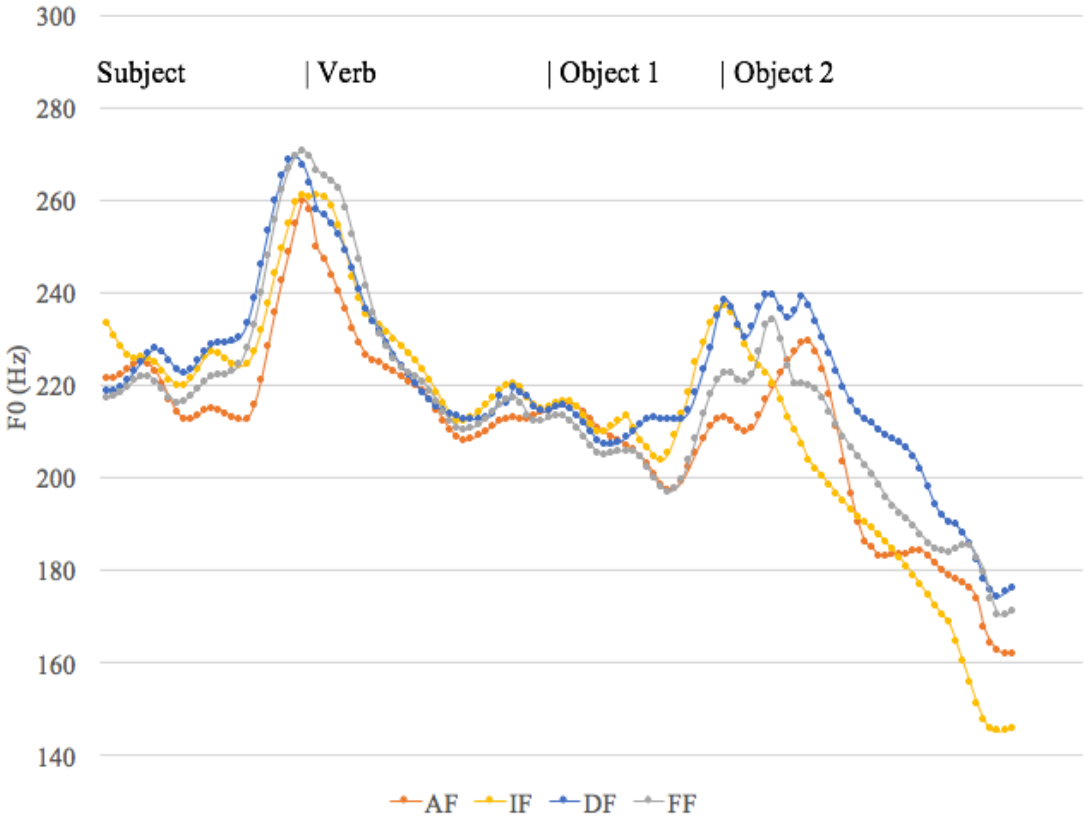
• High tone is often present on the focused constituent. It can be an initial, a medial or a final one. Sometimes there is no change at all in comparison with the all-new realization.

• Focus is sometimes accompanied by post-focus compression, however less so than in German, and less so in objects than in adjuncts.

• Focused constituents may be separated by a preceding boundary tone, but they do not have to. This happens more often before adjuncts than before objects.

• Averaging over 8 speakers obliterates individual strategies.

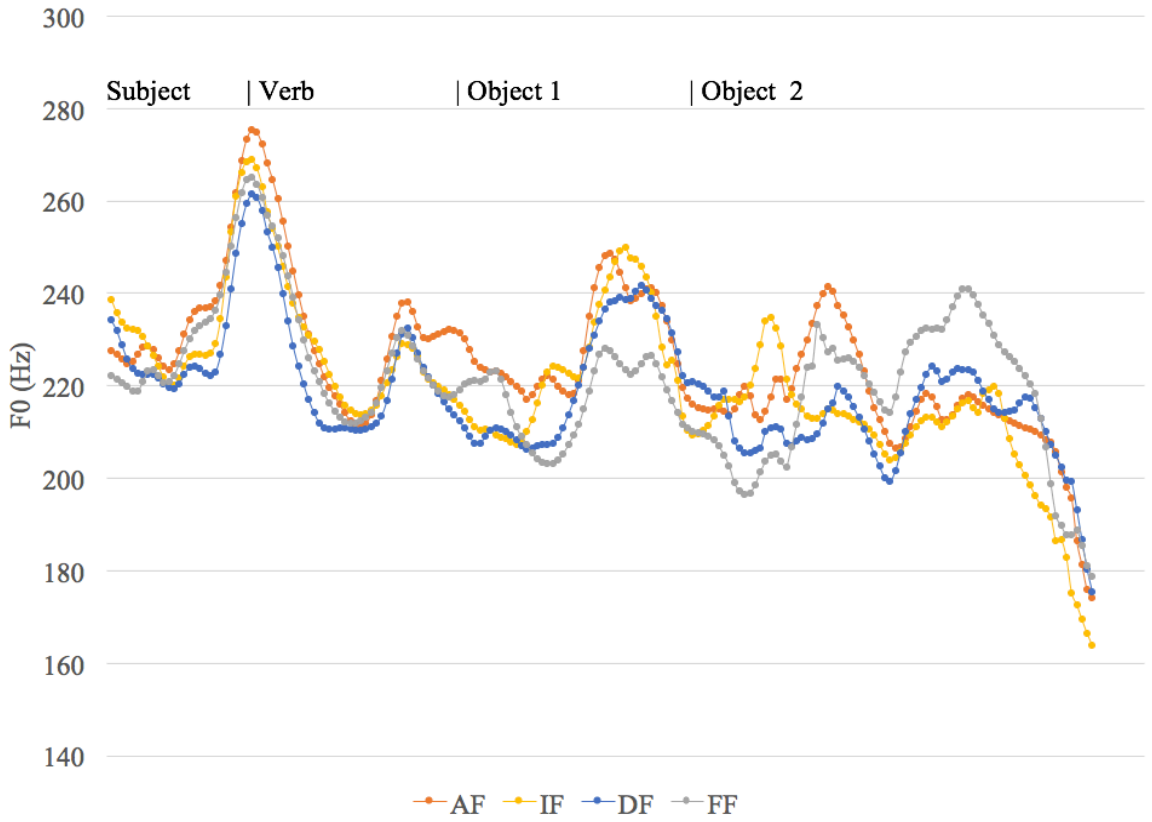
All four conditions: Two short objects



[[B e r n a d e tte]$_{\varphi}$ [a p r é s e n t é]$_{\varphi}$ [son c o l l è g u e]$_{\varphi}$ [à l e u r r i v a l]$_{\varphi}$]$_{I}$
Bernadette has introduced her colleague to their boss

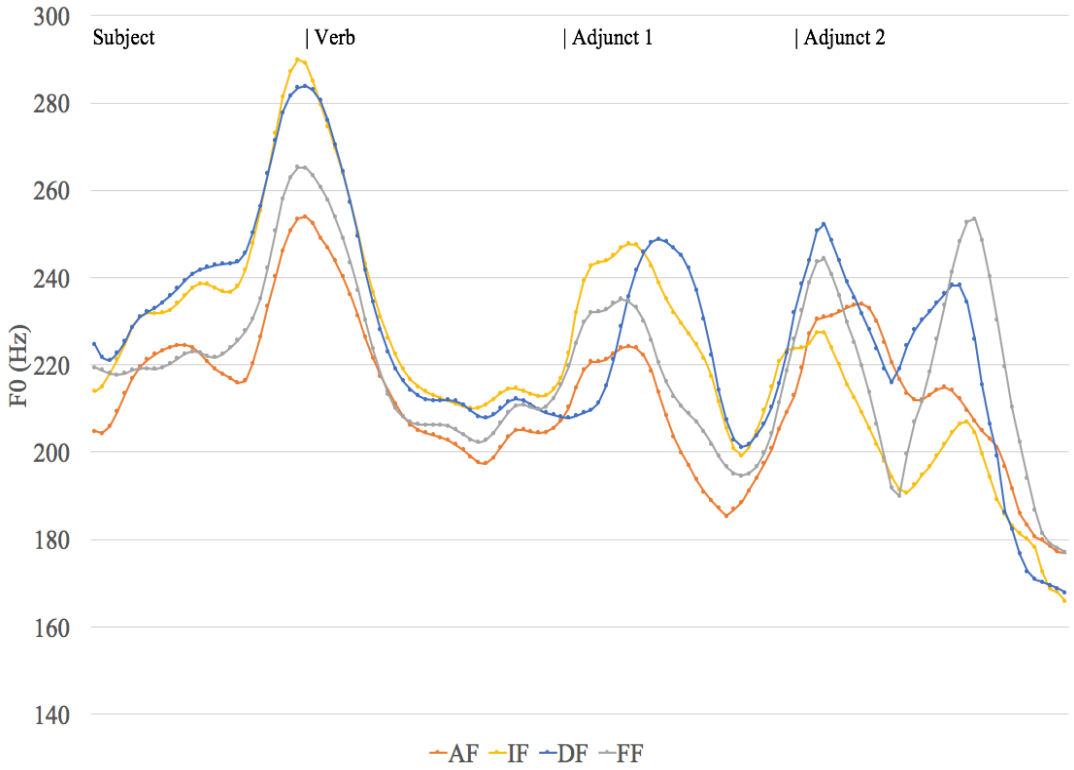
AF DF

All four conditions: Two long objects



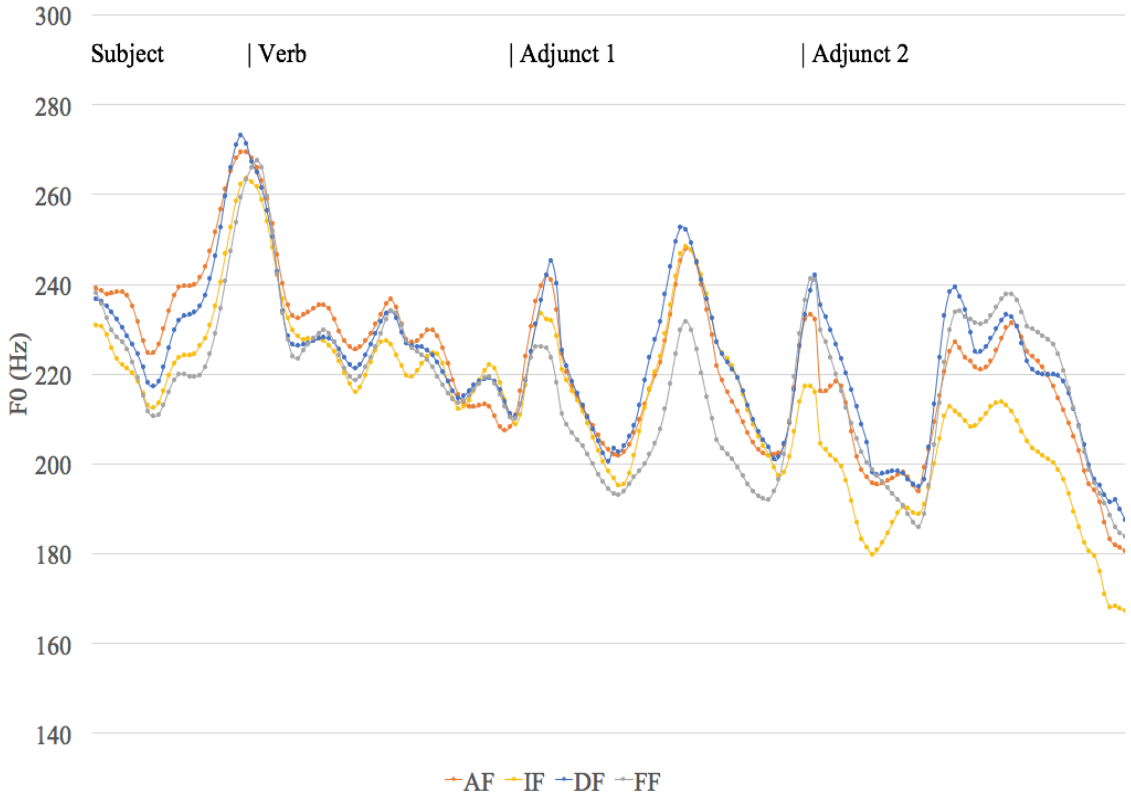
[[Benjamin$_{\varphi}$ [a commandé]$_{\varphi}$ [des noix de Macadamia]$_{\varphi}$ [à son chef de cuisine]$_{\varphi}$]$_{I}$
Benjamin has ordered Macadamia nuts to his kitchen chef

All four conditions: Two short adjuncts



[[Bernadette]$_{\varphi}$ [l'a présenté]$_{\varphi}$ [dans le couloir]$_{\varphi}$ [pendant la pause]$_{\varphi}$]$_{I}$
Bernadette has introduced him in the hallway during the break

All four conditions: Two long adjuncts



[[Bernadette]$_{\varphi}$ [l'a présenté]$_{\varphi}$ [dans la salle de réunion]$_{\varphi}$ [pendant le dîner d'adieu]$_{\varphi}$]$_{I}$
Bernadette has introduced him in the conderence room during the farewell dinner

Results for French: most obvious similarities in all sentences

A striking property is that the subjects and the beginning of the verbs were realized in the same way in all conditions.

A non-final constituent always bears a final high tone. This high tone was present in all focus conditions, and thus it seems to be dependent on phrasing rather than on d

When the constituent was long, there was also an additional high tone.

All speakers realized the sentences as declaratives: all of them ended in a low tone (or in some instances at mid-level. In cases where the last constituent was deaccented, the first constituent ended with a falling contour.

A further common property is that the IF condition sometimes triggered post-focal compression.

Results for French: most obvious differences

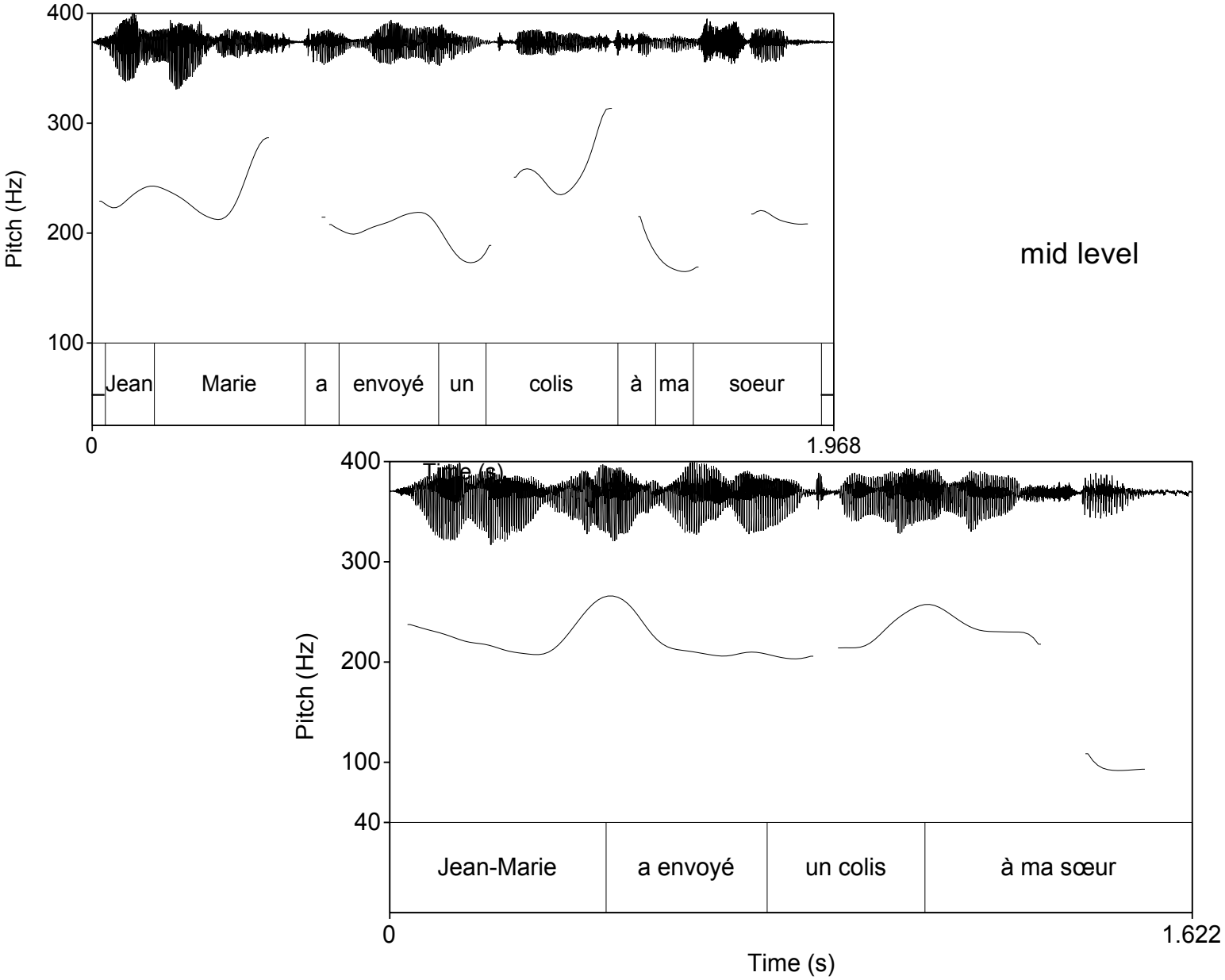
Individual variation was huge:

The number of peaks in each constituent and their position

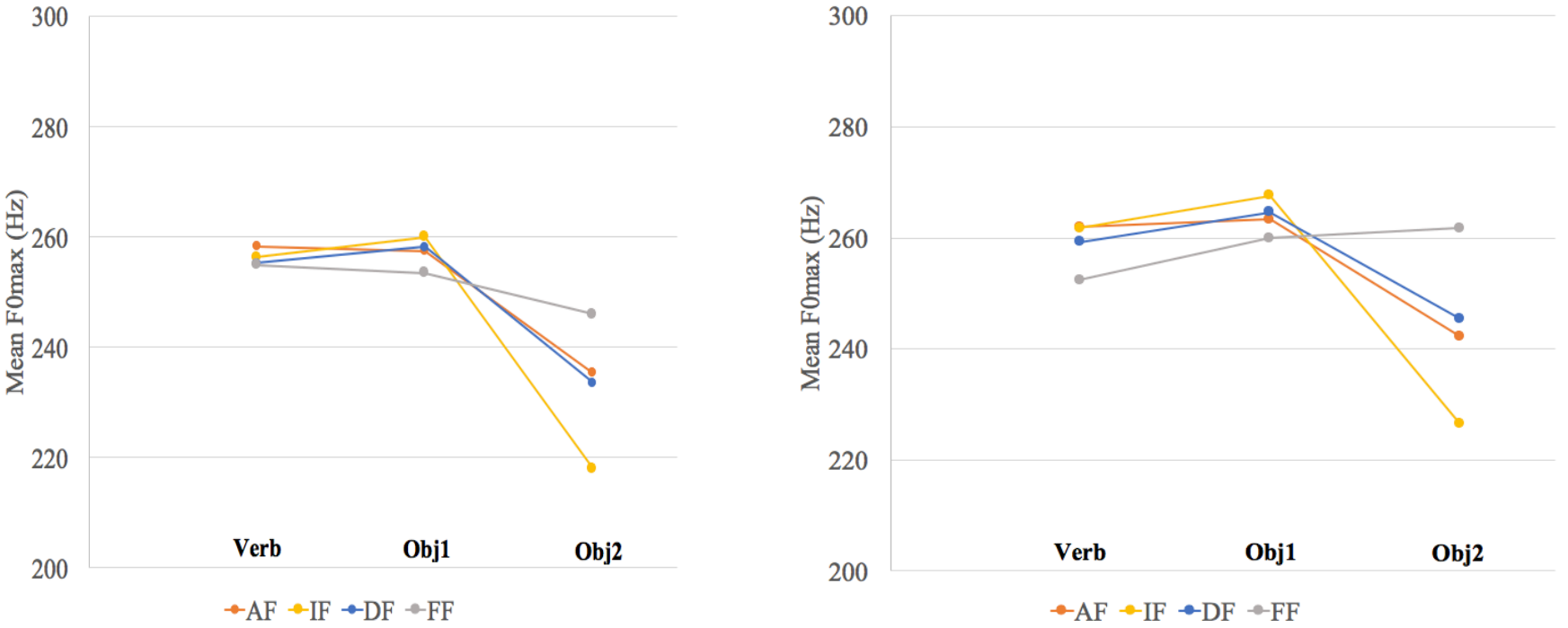
Tonal scaling: the height of the high tones, downstep, deaccenting

Breaks before and after constituents

Results for French: most obvious differences

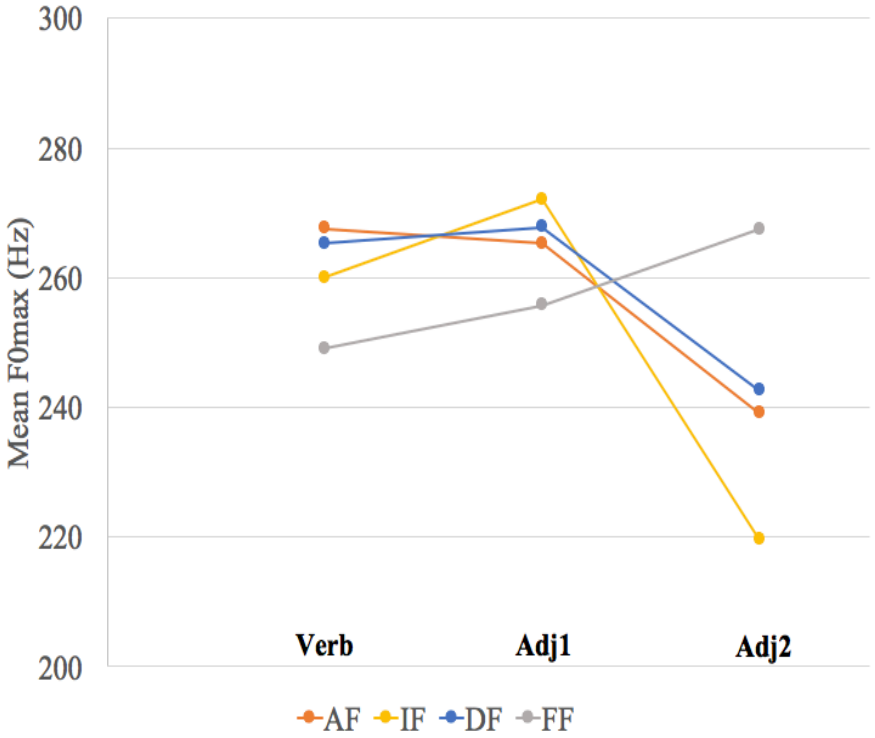


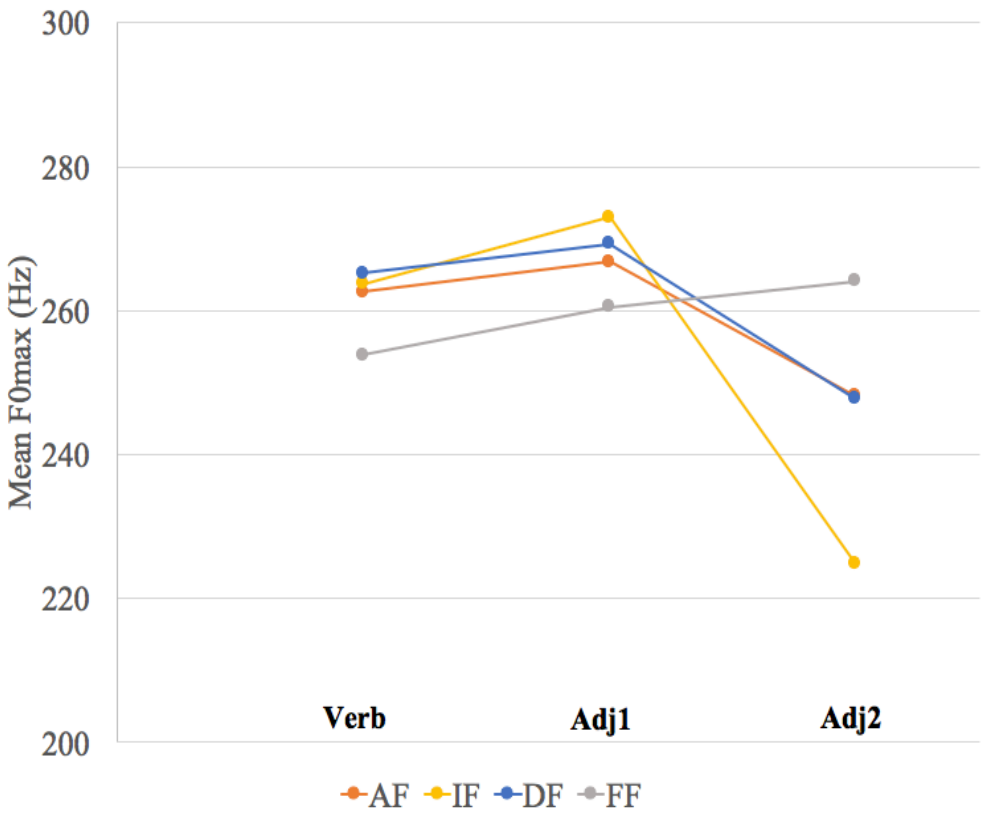
F0: Results for objects



Pooled normalized means for F0max per focus condition for the SVOO short and long sentences (left and right, respectively).

F0: Results for adjuncts





Pooled normalized means for F0max per focus condition for the SVAA short and long sentences (left and right, respectively).

Comparison across languages

It is not the case that all languages react in the same way when confronted to conflicts such as the one that was investigated here.

In Mandarin and French, the effect of focus is independent from the formation of prosodic domains or prosodic prominence assignment. Prosodic structure is derived exclusively on the basis of syntactic information. Focus on the other hand cannot modify the prosodic structure directly, but only affect the implementation of material within the prosodic structure.

In German, phrasing itself is affected, and boundary tones are present or absent.

Mandarin

Mandarin does not change the syntax-based phrasing due to the pressure to realize two equally prominent foci in one sentence. But it boots the tone on the focus (if available) and has post-focal compression.

(**Wang.Ying**)$_{\varphi}$ (can.guan **che.jian**)$_{\varphi}$
Wang Ying visit workshop.
'Wang Ying visited the workshop.

(**Wang.Ying**)$_{\varphi}$ (can.guan (Shan.Xi Qing.Xiang yi.jie **che.jian**)$_{\varphi}$)$_{\varphi}$
Wang.Ying visit Shan.XiQing.Xiang first-street workshop
'Wang Ying visited the Shan.Xi Qing.Xiang first-street workshop.'

French

French does not change the phrasing either

(Bernadette)$_{\varphi}$ (a présenté (**son collègue**)$_{\varphi}$)$_{\varphi}$ **(à leur rival**)$_{\varphi}$
Bernadette introduced her collègue to their rival

Focus changes the tonal structure of the prosodic phrases, and delimits their boundaries with higher initial or final tones.
Post-focal compression is optional.
Realization of focal reflexes is speaker-dependent.

German

×				×		ι-phrase
×			x	×		Φ-phrase
×	×	×	×	×	×	ω-word

[(Der brasilianische$_F$ Lehrer)$_\Phi$ (hat heute morgen)$_\Phi$ (Mali$_F$ gelobt)$_\Phi$]$_\iota$ DF

The Brazilian teacher has today morning Mali praised

- This metrical pattern proposes to treat both focal accents as equally prominent. In other words, in the dual focus cases there is no culminativity at the level of the ι-phrase.
- Nuclear Stress Rule or Head of IP or any other principle assigning the maximal prominence to the rightward accent in an ι-phrase is cancelled here.

Conclusion

The questions investigated here was:

1. Can we predict the kind of correlates that a language uses to express focus and givenness when we understand its prosodic and tonal structure?

Clearly, the answer cannot be a simple yes or no, but has to be answered case by case.

We can however expect that a language that freely manipulates F0 has more chances to assign pitch accents if pitch accents are truly part of its tonal inventory (thus if it has lexical stresses to which the pitch accents can dock to).

If not (tones languages, phrase languages) the technique used by prosody is a different one. Which one exactly is dependent on other parts of grammar.

2. Some languages use syntax more than others to express focus. English use pitch accents in situ in a number of cases, French, a so-called 'phrase language', does not have pitch accents as English has and assigns phrase tones more freely and more variably than English.