



# Some remarks on the representation of focus in Egyptian Arabic

Conference on Intonational Variation in Arabic  
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# Outline

- n AM analyses of Egyptian Arabic (EA) intonation
- n information structure and intonation in EA
  - preliminary results of an experiment
  - phonetic cues to focus
- n issues of representation



# Egyptian Arabic (EA) intonation

- n AM approaches to the intonation of EA
  - Rifaat 1991 (Classical Arabic)
  - Rastegar-El Zarka 1997 (Modern Standard Arabic)
  - Rifaat 2003 (Modern Standard Arabic)
  - Hellmuth 2006 (Colloquial Arabic)
- n intonation language with post-lexical accents
- n stress is predictable:
  - moraic trochee (Hayes 1995)
- n a pitch accent on almost every content word (Hellmuth 2006)



# Pitch accents in EA

- n limited set of pitch accents:
  - LH prenuclear and HL nuclear (Rifaat 1991)
  - basically HL, conditioned H, only H boundary tone (R.-El Zarka 1997)
  - basic H (prenuclear) and HL (nuclear), marginal LH (nuclear), L (very limited), no boundary tones (Rifaat 2003)
  - LH, phrase tones, boundary tones (Hellmuth 2006)



# Alignment of tones

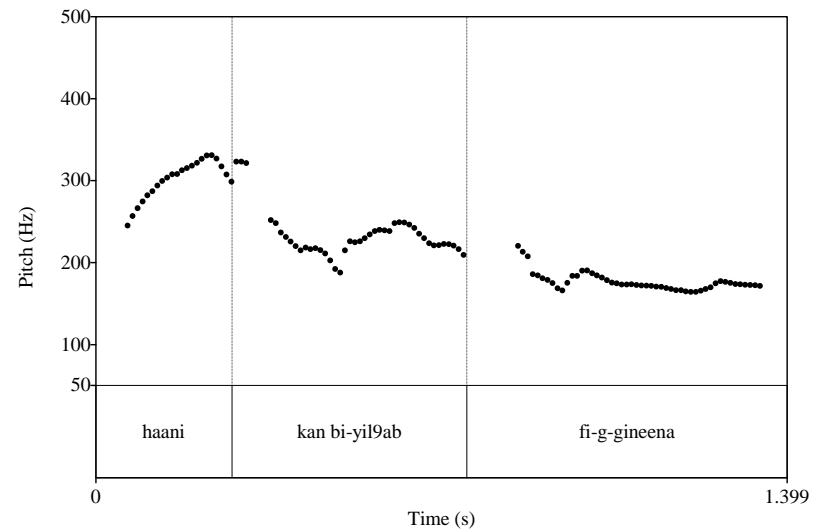
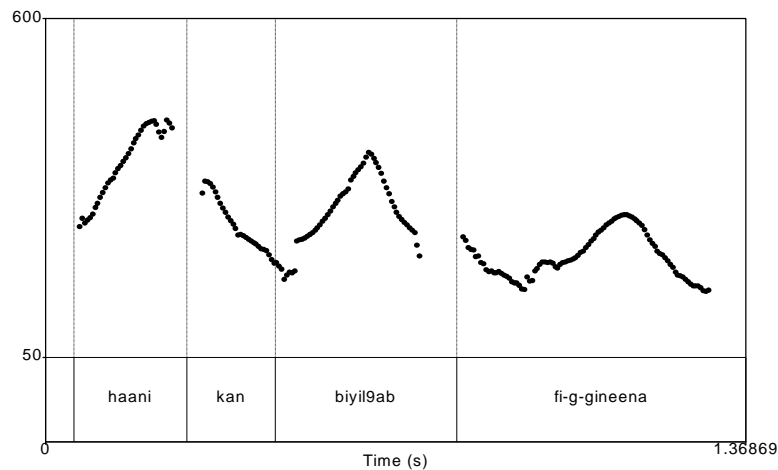
- n Rifaat (1991, 2003):
  - L at syllable onsets, H at the end of the nuclear syllable (in the middle of stress group) and early in HL (syllable onset)
- n R.-El Zarka (1997):
  - H late in the nuclear syllable or in within vowel, L at onset of following nuclear syllable (tone linking) or at the end of prosodic word or end of nuclear syllable
- n Hellmuth (2006, 2007)
  - L stably aligned with syllable onset, H more variable: 2<sup>nd</sup> mora of heavy syllable or following light syllable



# Association of accents

- n Rifaat (1991): nuclear syllable
- n R.-El Zarka (1997):
  - .. tonal domain starting with accented syllable, usually to next accented syllable as a result of tone linking (Gussenhoven 1983) (cf. Abercrombian accentual foot)
- n Rifaat (2003): stress foot
- n Hellmuth (2007): foot (bimoraic trochee)

# A typical intonation contour

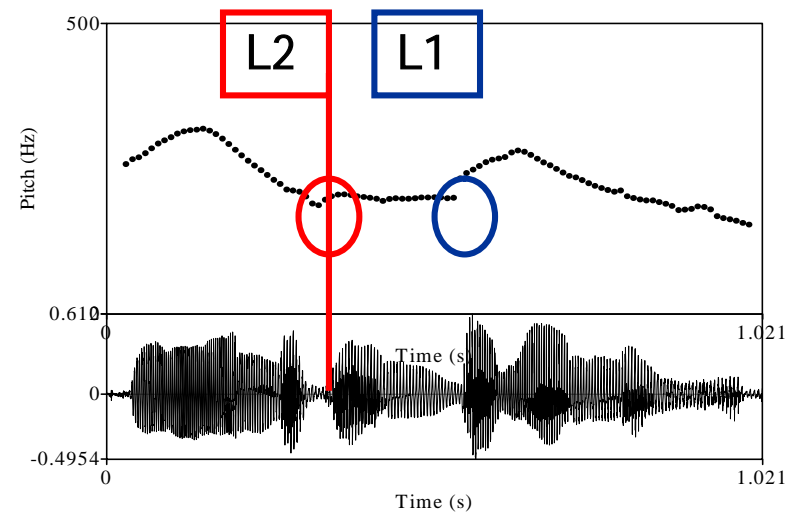
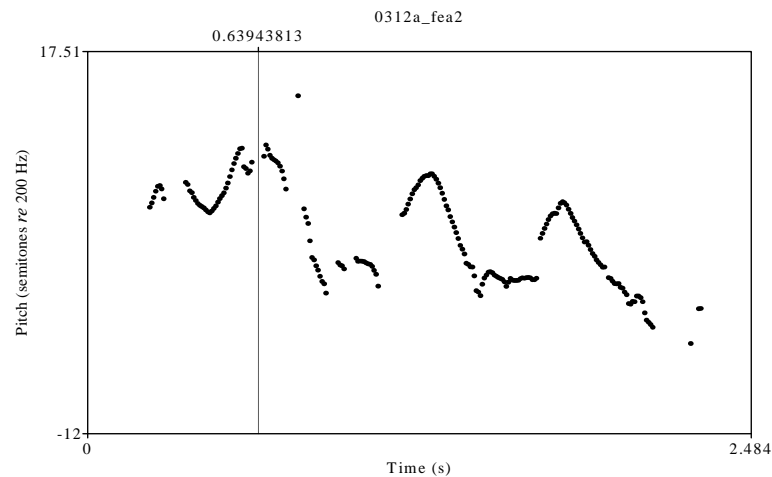


basic pitch movement: **rise** – **fall**

last accent frequently downstepped (right panel)

# A second low target

- L2: low tone at beginning of next word
- L1: low tone at beginning of stressed syllable



Hellmuth & El Zarka (2007)

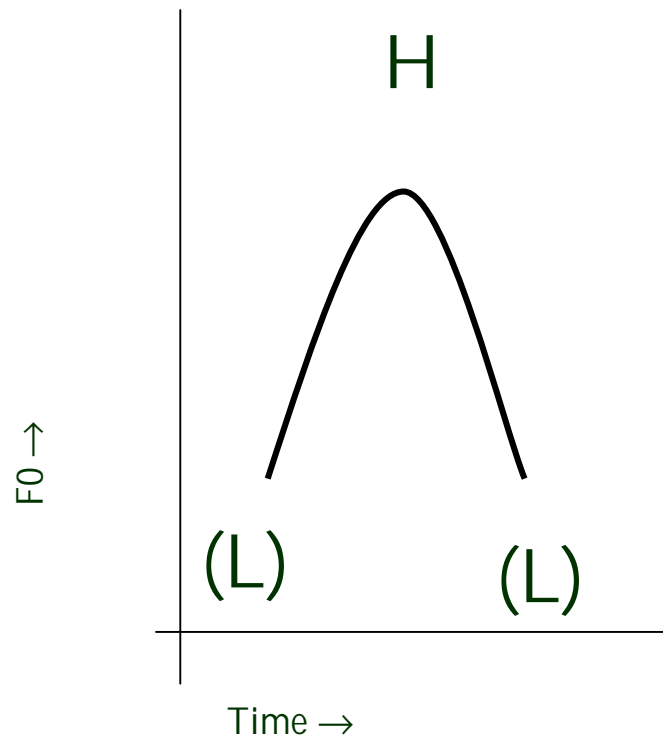
El Zarka & Hellmuth (2009)

... (daka).KII.N illi | gam.BI.na ....

shops REL beside.us



# Basic accent shape



Rifaat (2003): H

El Zarka (2008): LHL



# Impressionistic descriptions of focus

n strongest prominence can be moved to different constituents – „nuclear mobility“ (Hellmuth 2009)

HelieI (1976)

Gary & Gamal El-Din (1982)

Mitchell (1993)



# Prosodic and syntactic facts

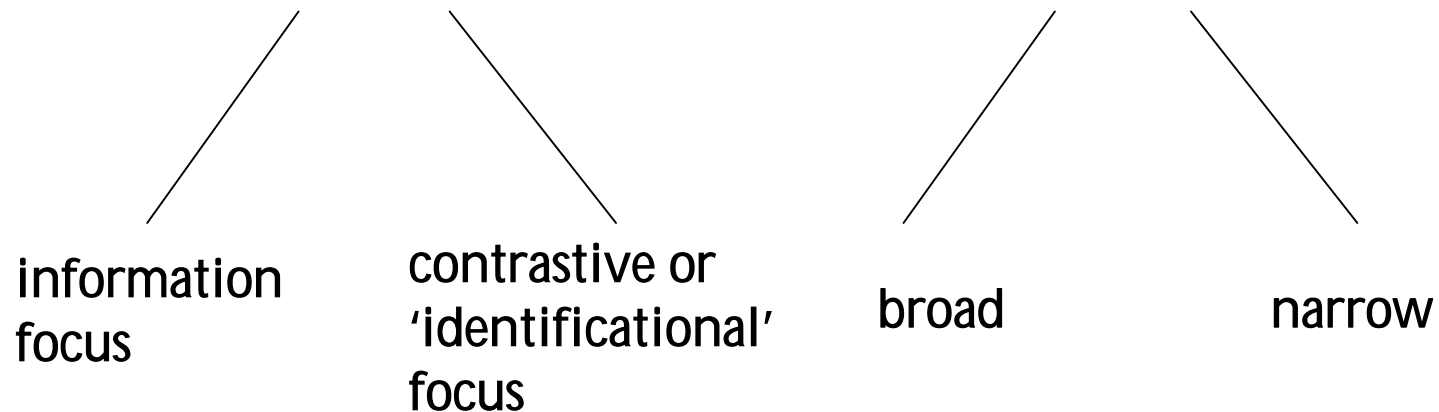
- n almost every content word carries a pitch accent (Hellmuth 2006: 96% of her data)
- n EA does not readily deaccent given material (Hellmuth 2005)
  - .. similar to Romance languages
- n EA heavily relies on syntactic structures to encode information structure
  - .. ⇒ „non-plastic accent language“ (Vallduví 1991)



# Different types of focus

communicative function

scope



(Dik et al. 1981, E. Kiss 1998)

identificational focus: " a subset of the set of contextually or situationally given elements for which the predicate phrase can potentially hold" (E. Kiss 1998)



# Prosodic correlates of focus

## n expansion of pitch range

- Norlin (1989), Asker (1992): *contrastive focus*; R.-El Zarka (1997): narrow/early focus; Rifaat (2003), Hellmuth (2006): *contrastive focus*

## n compression or „subordination“ after focussed item

- Norlin 1989, R.-El Zarka (1997), Hellmuth (2006)

## n global characteristics (trend line)


- Norlin (1989), Rifaat (2003): for sentence mode
- El Zarka (2008): topic vs. focus
  - n downstep (declination) as a property of the phrase and suspension of downstep (declination)



# Prosodic correlates of focus

## n different accent shapes

- Asker (1992): accent shape of nucleus differs from that of prenuclear stretch (rise-fall after level)
- R.-El Zarka (1997): narrowing of fall in narrow focus condition: position of trailing L tone of H\*L accent, L closer to H in focus condition ( $H^*L > H^*+L$ )
- Rifaat (2003): HL (only tune finally)
- El Zarka (2008): closing tonal contour for focal constituents (vs. leading tone for topical constituents)



# Experimental data (El Zarka in prep.)

## n Production experiment:

- 6 speakers
- 2 sets of structurally identical sentences
- 5 target words with different syllable structures per set
- sentences to be read from a computer screen after listening to question

## n focus types:

- 1 broad focus conditions
- 2 narrow information focus) conditions (2<sup>nd</sup> and final position)
- 2 late narrow *contrastive* focus conditions (corrective)

# Example sentences

## A) broad focus: information

(ناجي فين؟) ناجي راح ملعب المنيل.

naagi raaH MAL9AB IL-MANYAL

## B) narrow focus: information

(شفتو ناجي فين؟) شفنا ناجي في ملعب المنيل.

shufna naagi fi MAL9AB IL-MANYAL

(شفتو مين في ملعب المنيل؟) شفنا ناجي في ملعب المنيل.

shufna NAAGI fi mal9ab il-manyal

## C) narrow focus: contrastive focus (CF1 and CF2)

(شفتو ناجي في مكتبة المنيل؟) لا، شفنا ناجي في ملعب المنيل.

laa, shufna naagi fi MAL9AB il-manyal (CF1)

(شفتو ناجي في ملعب الروضة؟) لا، شفنا ناجي في ملعب المنيل.

laa, shufna naagi f-mal9ab il-MANYAL (CF2)





# Qualitative observations

- n a variety of patterns were produced (cf. also de Jong & Zawaydeh 2002)
- n all speakers produced strongest prominence on contrastively focussed items of the *Idafah* (narrow contrastive)
- n only 3 speakers consistently produced strongest prominence on early narrow information focus



# Qualitative observations

- n *broad focus*: frequently „neutral declarative“ with  
downdrifting contour
- n focus on the whole *Idafah*-constituent (*final  
narrow information*): frequently strongest  
prominence on 1st accent of *Idafah* (similar to  
*contrastive focus* on first part of *Idafah* - CF1)
- n *narrow contrastive focus*:
  - expansion of pitch range on CF1, compression on CF2
  - in case of CF2 occurrences of downstep



# Hypotheses tested (El Zarka 2008)

Topical constituents: **leading accent or tune** (if composed of more than one accent)

Bolinger (1958): ***B** accent*, Brazil (1975): ***referring** tone*,  
Gussenhoven (1983): ***selection***

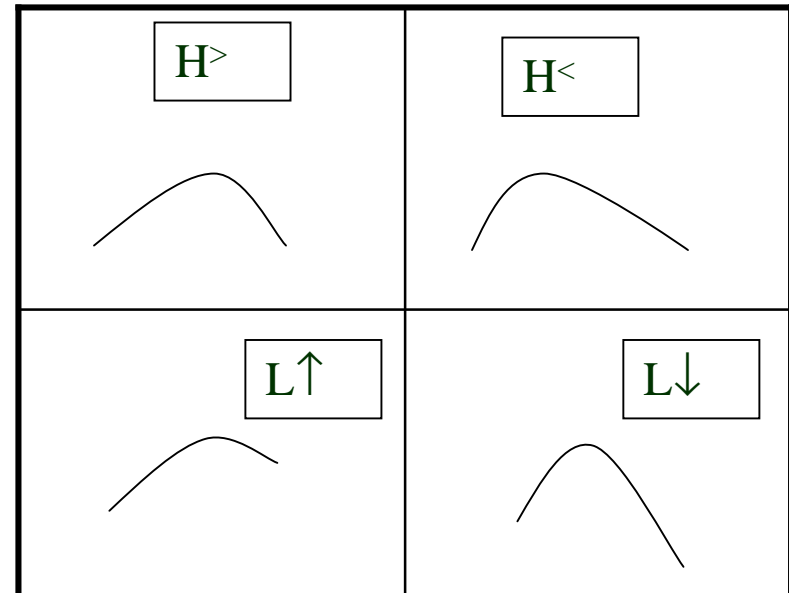
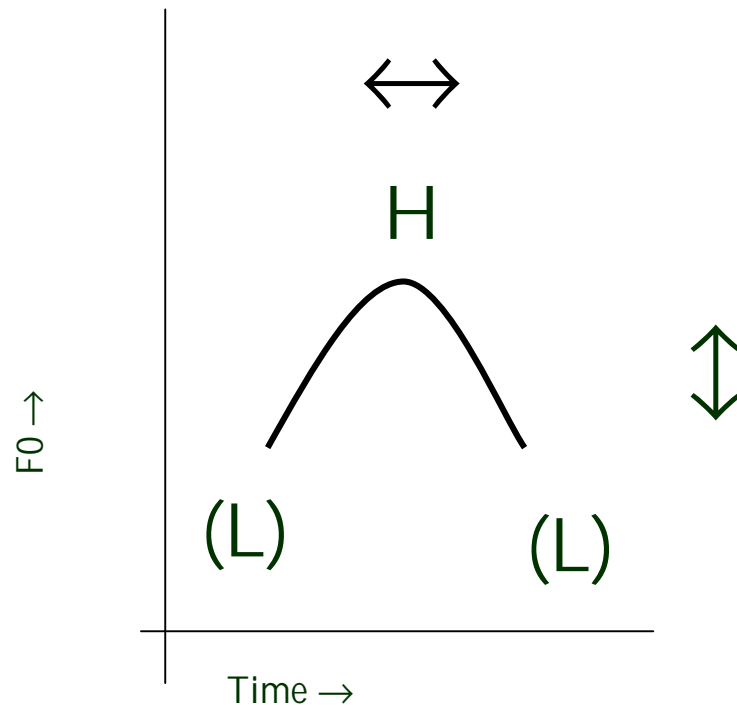
Focal constituents: **closing accent or tune**

Bolinger (1958): ***A** accent*, Brazil (1975): ***proclaiming** tone*,  
Gussenhoven (1983): ***addition***

# Functional modification of basic shape (El Zarka 2008, cf. also Rifaat 2003)

(cf. Gussenhoven 1983, Ladd 1983)

phonetic features of intonational peaks and valleys



accent: maximally a *rising-falling gesture*



# Fine phonetic detail and intonational meaning

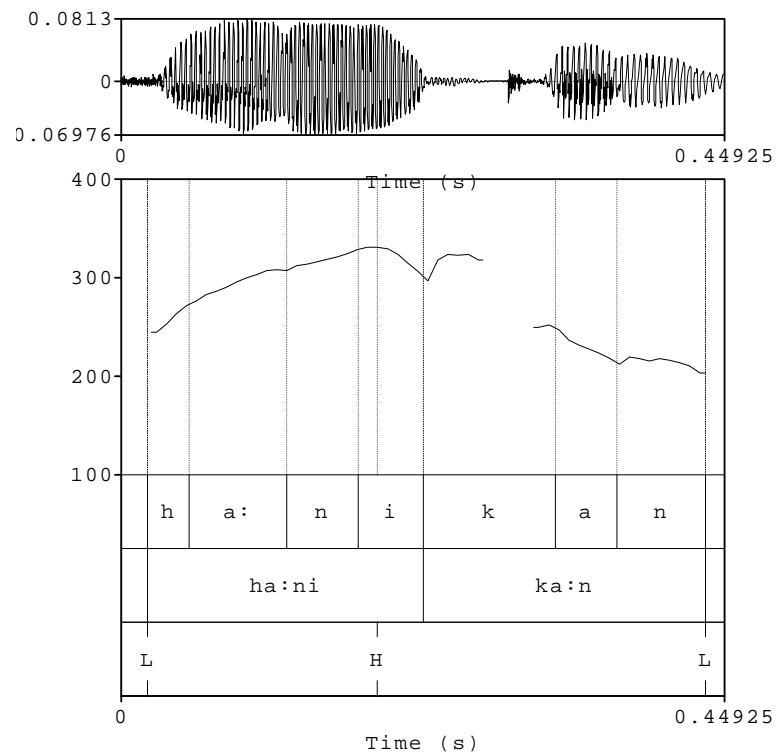
“Fundamental frequency (F0) varies along a number of phonetic dimensions, such as F0 range, register, shape, velocity of change, and alignment with the segmental string. They cue intonational meaning in complex ways, because they simultaneously express multiple functions: lexical tone, indexical, paralinguistic and linguistic information[...].”

“we argue that phonetic dependencies among parameters [...] will advance our understanding of intonational meaning.”  
(Post et al. 2007: 191)

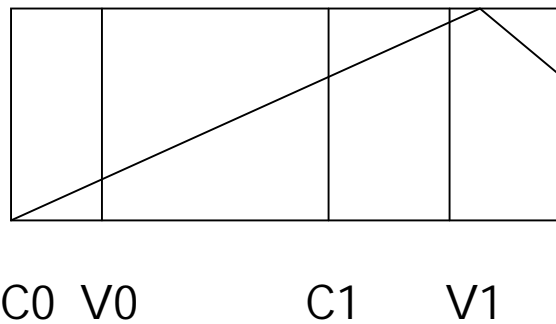
Testing hypotheses following recent studies:

- n Xu & Xu (2005)
- n Hellmuth (2006)
- n Hanssen et al. (2008)

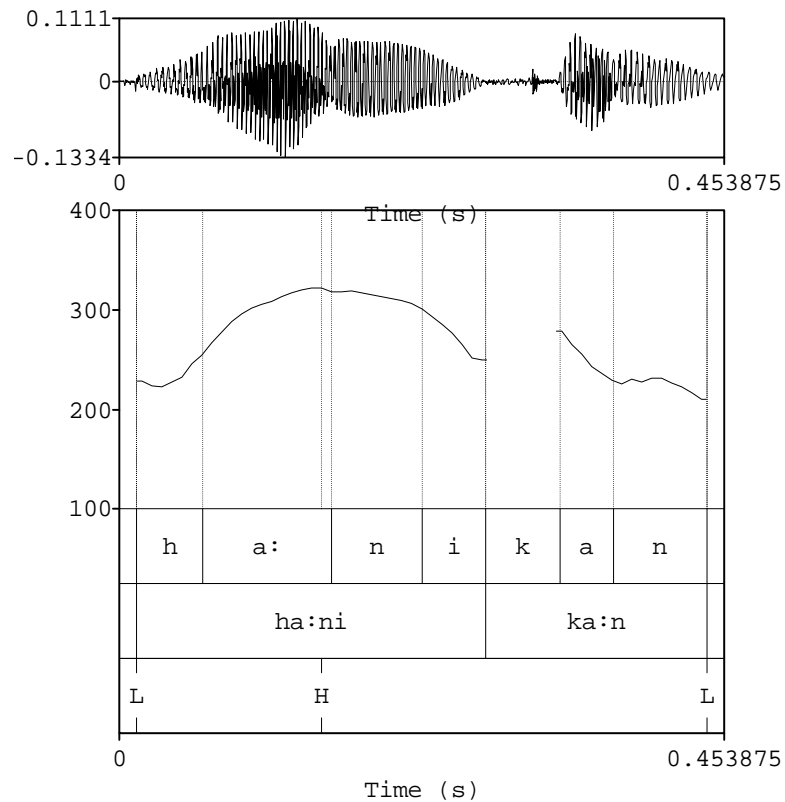
# Alignment of H - topic



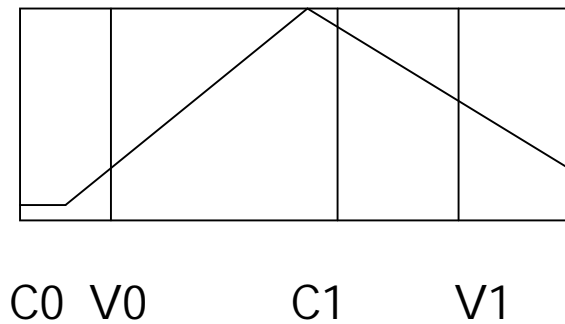
Haani  
CVV.CV



# Alignment of H - focus



Haani  
CVV.CV

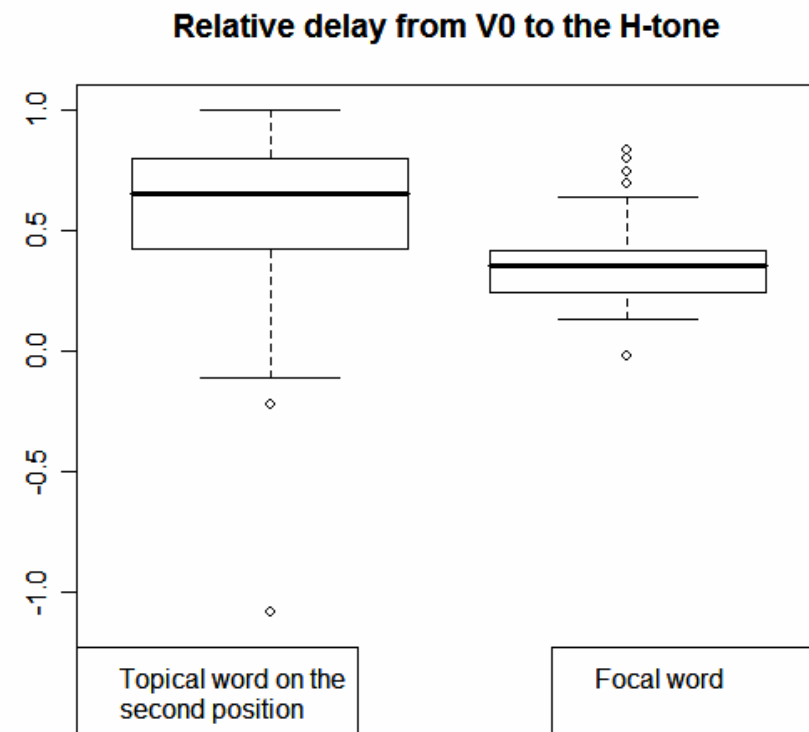


# Quantitative analysis of alignment

- n Shapiro-Wilk test to test normality
- n nonparametric Wilcoxon-Mann-Whitney test

**topic** vs. **focus**:

**delay** from V0 to the H-tone in relation to the interval V0 to wordend significantly different (p-value < 0.0001)







# Qualitative analysis: alignment of H to segmental landmarks

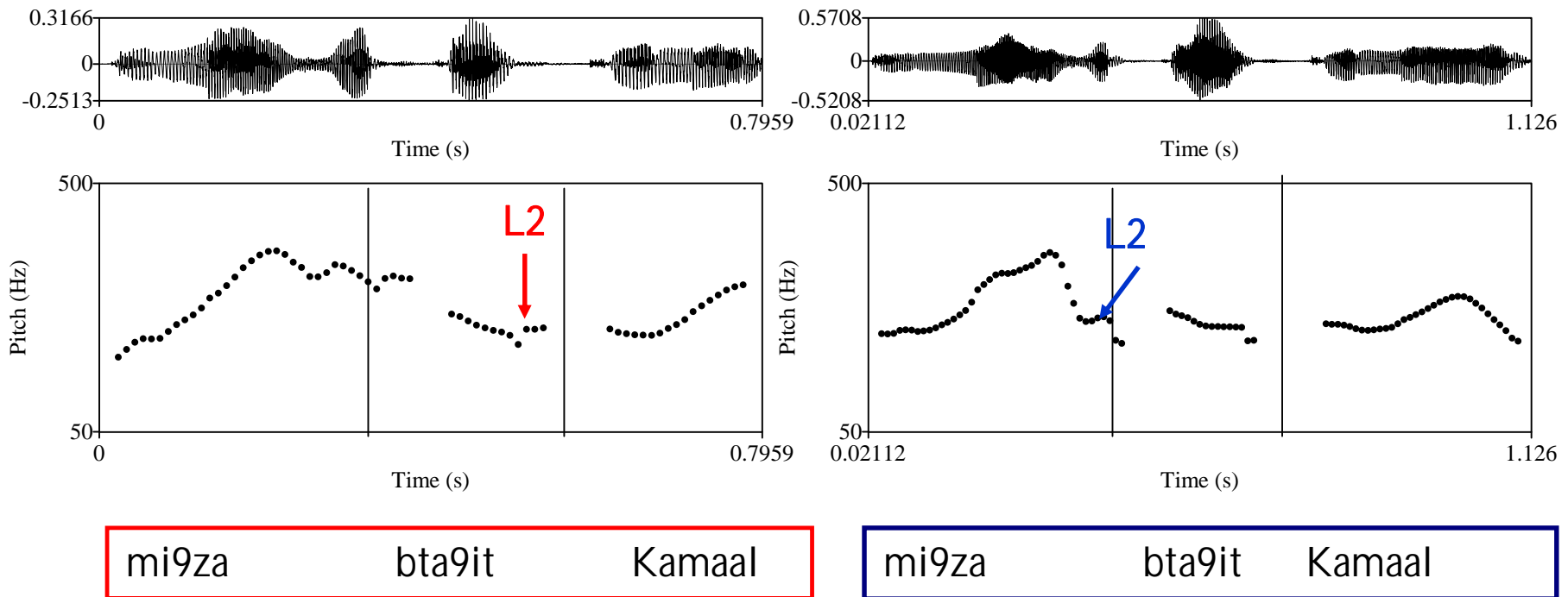
- n large inter-speaker variability:
  - within nuclear syllable (often vowel) for focussed items
  - in case of proparoxytonic stress (nagafa) often in postnuclear syllable despite focus position (one male speaker in nuclear vowel)
- n in postnuclear syllable for topical items (or later)
  - different strategies
    - fully rising topics,
    - level topics after initial rise
    - suspended falls



# Interpretation of alignment results

- n alignment no necessary cue to focus
- n earlier alignment due to more precise articulation or hyperarticulation (Lindblom 1990, Gussenhoven 2002)
- n large variability in topic position due to different contours, i.e. full rises, rise-level contours or suspended falls

# Long subject: topic vs. focus



"(the) goat of Kamal"



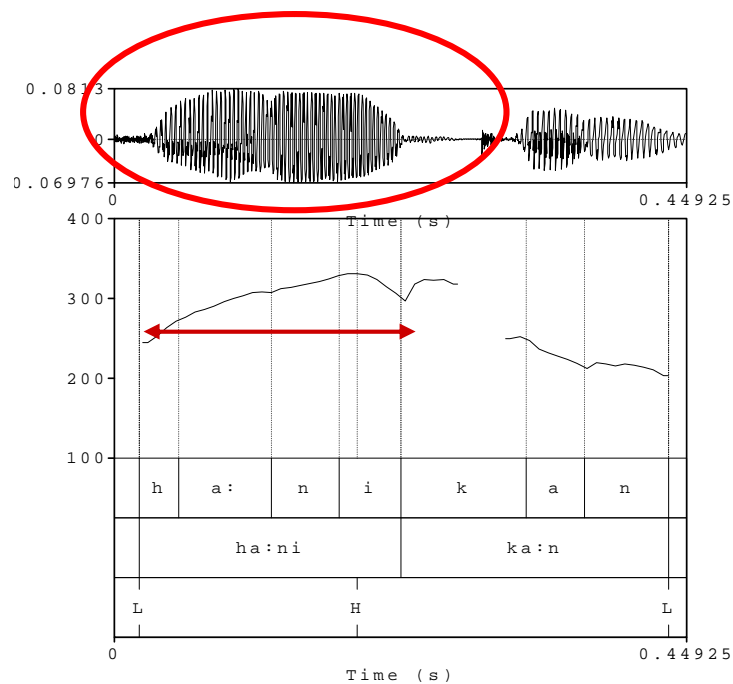
# Qualitative analysis: alignment of closing L-tone

n within the focussed item

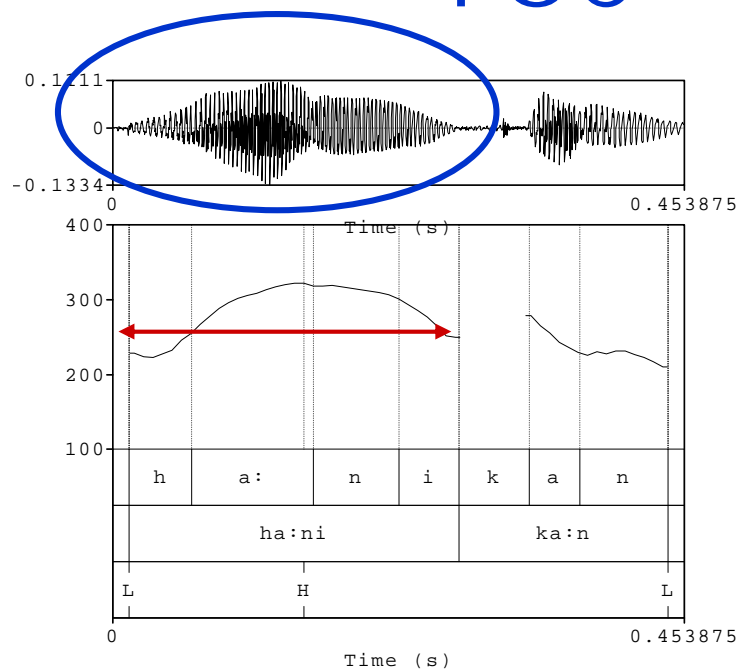
- inter-speaker variability
- sometimes at end of the nuclear syllable
- frequently at end of the word

# Multiple phonetic cues to focus

TOP



FOC



tone, intensity, duration



# Quantitative analysis: duration

(following Hanssen et al. 2008)

## **n onset duration, duration of nuclear vowel**

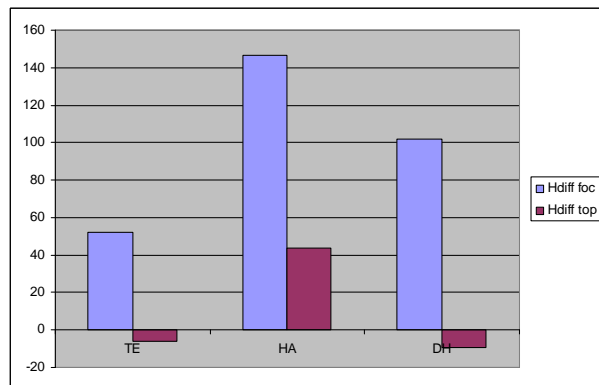
- absolute duration significantly different (p-value < 0.0001)
- relative duration broken by word duration: N.S.

⇒ duration of whole focussed word significant

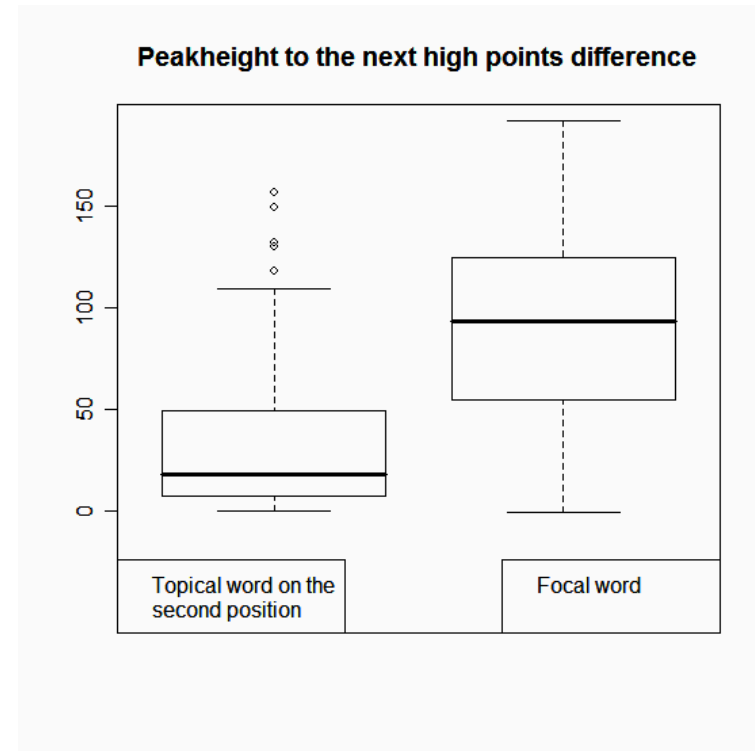
# Quantitative analysis: compression

## topic vs. focus

difference in peakheight between peak in topic or focus and next peak (cf. right panel): significantly different ( $p\text{-value} < 0.0001$ )



with minus values – next peak frequently higher



without minus values – only items with next peak same or lower

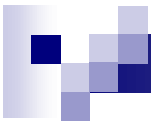


# Quantitative analysis: expansion

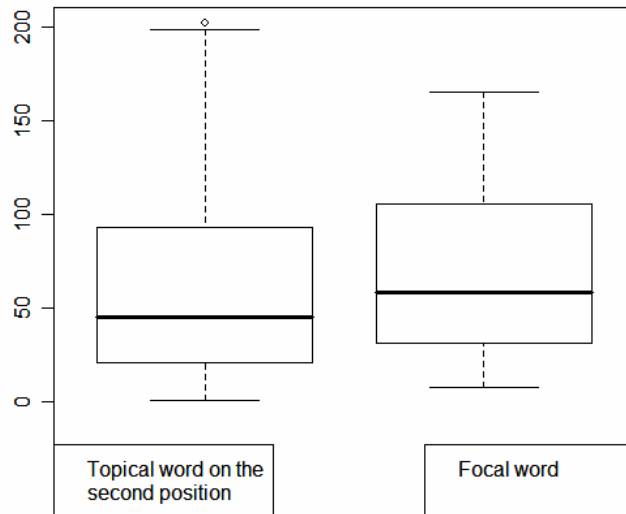
## topic vs. focus

- n absolute peak height difference: questionable (p-value = 0.01169)
- n difference in rise questionable (p-value = 0.06713)
- n difference in **fall to next L** or to **wordend** significantly different ( $p < 0.0001$ )
- n difference in rise vs. fall (to next low):
  - N.S. for topics ( $p = 0.6618$ )
  - significantly different for foci ( $p = 0.000229$ )

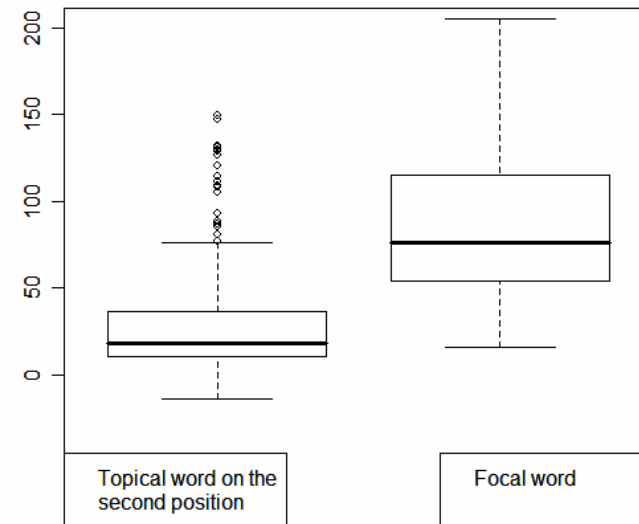




**Amount of rise**

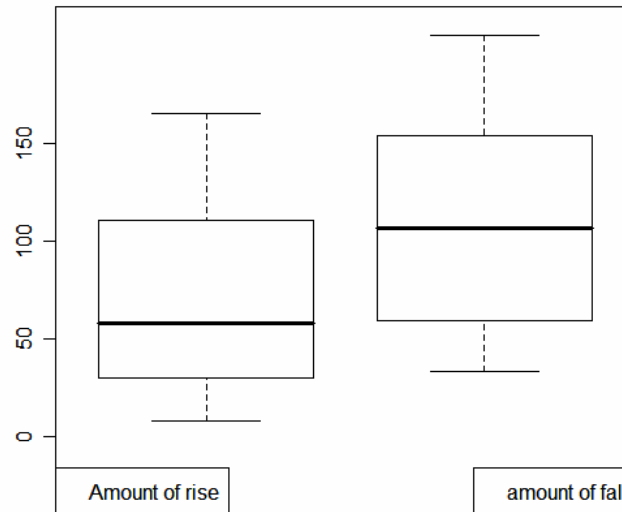


**Amount of fall to wordend**



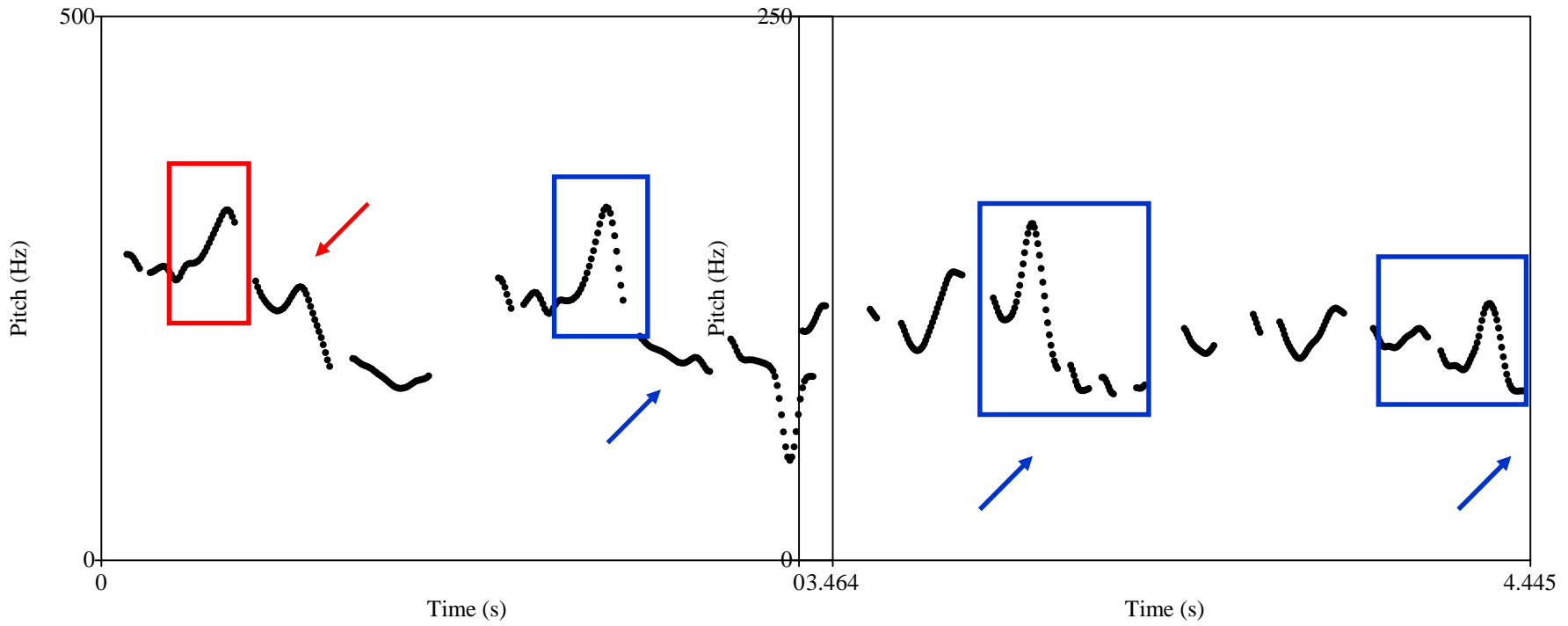
N.S.

**Focal word - amount of rise vs. amount of fall**



(p-value < 0.0001)

(p = 0.000229)



**TOPIC**

**FOCUS**

CF1 (speaker M01)

CF2 speaker M01)



# Summary of preliminary results

features signalling narrow information focus:

## categorical features:

- n compression after focused item
- n falling gesture more important than rising gesture
  - lower L2
  - earlier aligned L2

## gradient features:

- n longer duration
- n optional pitch range expansion
- n greater articulatory precision (alignment of H within nuclear vowel)

cf.

English (Xu & Xu 2005)

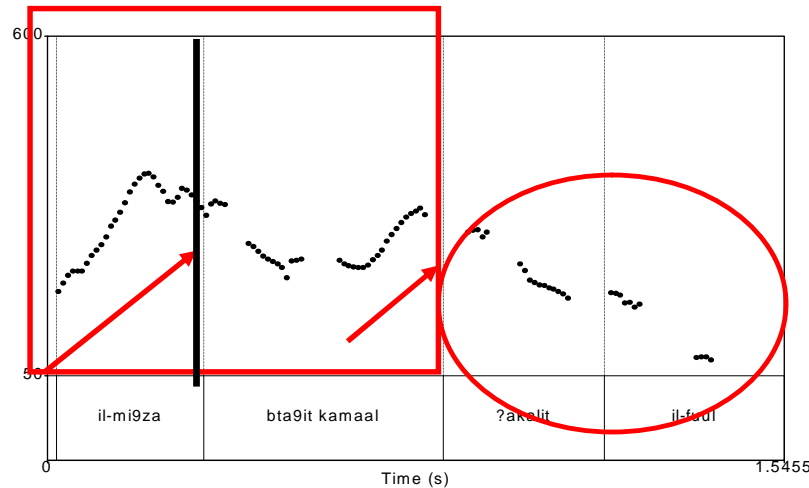
Dutch (Hanssen et al. 2008)

German (Mücke et al. 2009)

} hyperarticulation,  
Lindblom 1990,  
effort code,  
Gussenhoven  
2002;

# Long subject with possessive construction: **topic** vs. **focus**

perceptually: a rise

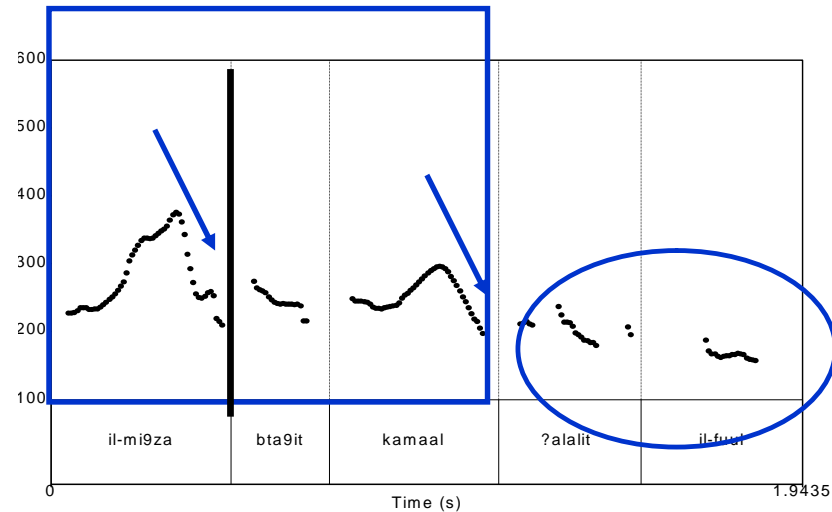


**il-mi9za bta9it Kamaal** ?akalit il-fuul.

**TOPIC**

comment

perceptually: a fall



**il-mi9za bta9it Kamaal** ?akalit il-fuul.

**EARLY FOCUS**

presupposed



data from SFB  
Information Structure, D2





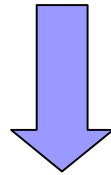
# Issues of representation

- n pitch accent LH + phrase accent (with secondary association) (Grice 1995, Benz Müller and Grice 1998, Grice, Ladd and Arvaniti 2000, Arvaniti, Ladd and Mennen 2006)
- n falling pitch accent (R.-El Zarka 1997, Rifaat 2003; Gussenhoven 1983 and subsequent work, Uhmann 1991, Féry 1993, Frota 2000, Grabe et al. 2000)
- n tritonal pitch accent (El Zarka 2008; Mücke et al. 2009 mention this possibility)



# Issues of representation

functional categories



surface phonological representation

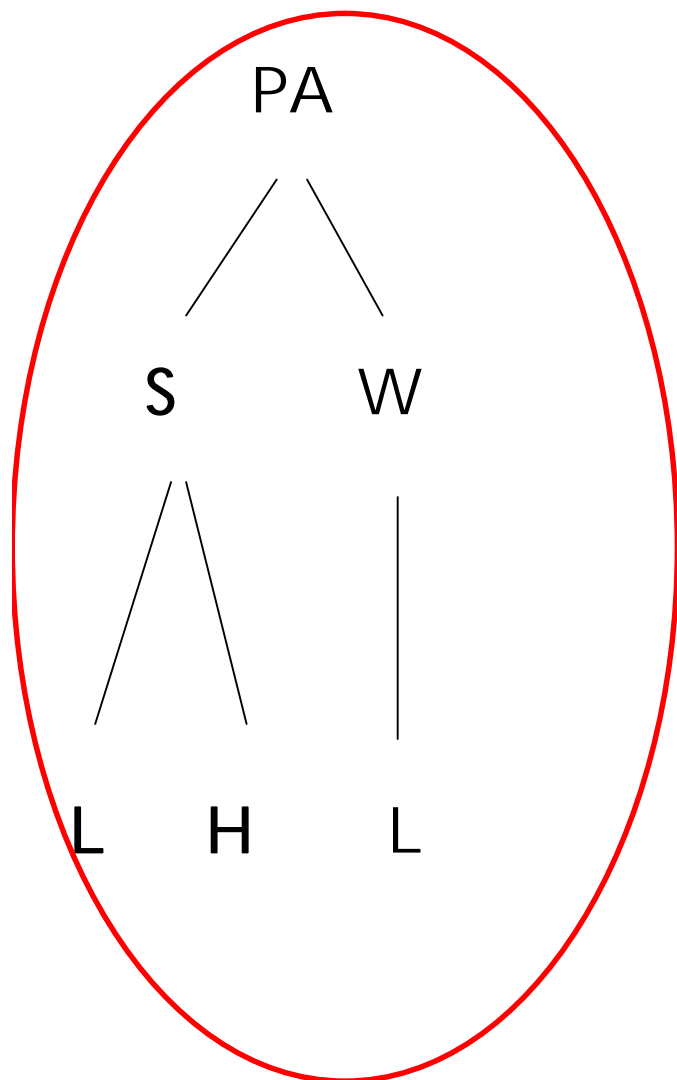
Hirst et al. (2000)



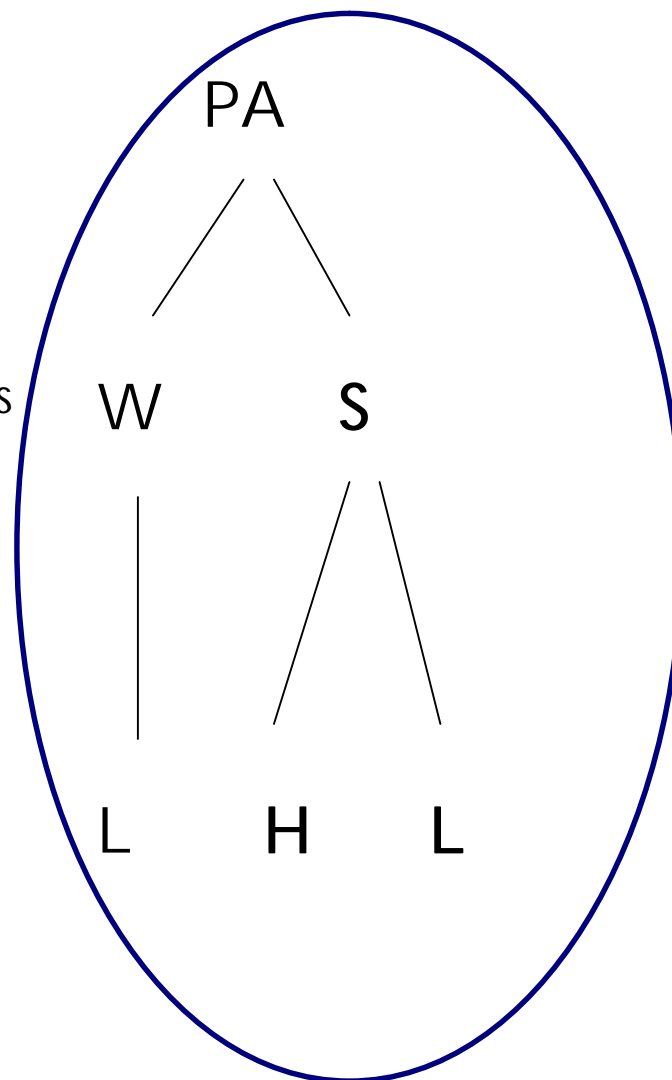
# Main characteristics

- n focus affects the **falling part** of the trajectory, and may leave the rising part unaffected (cf. also Hanssen et al. 2008)
  - occasional occurrence of low elbows in the vicinity of nuclear syllable
  - velocity of fall is highest in the first part of fall – elbow
- n syntagmatic relation between accents – compression equivalent to deaccentuation

# Leading and closing accents

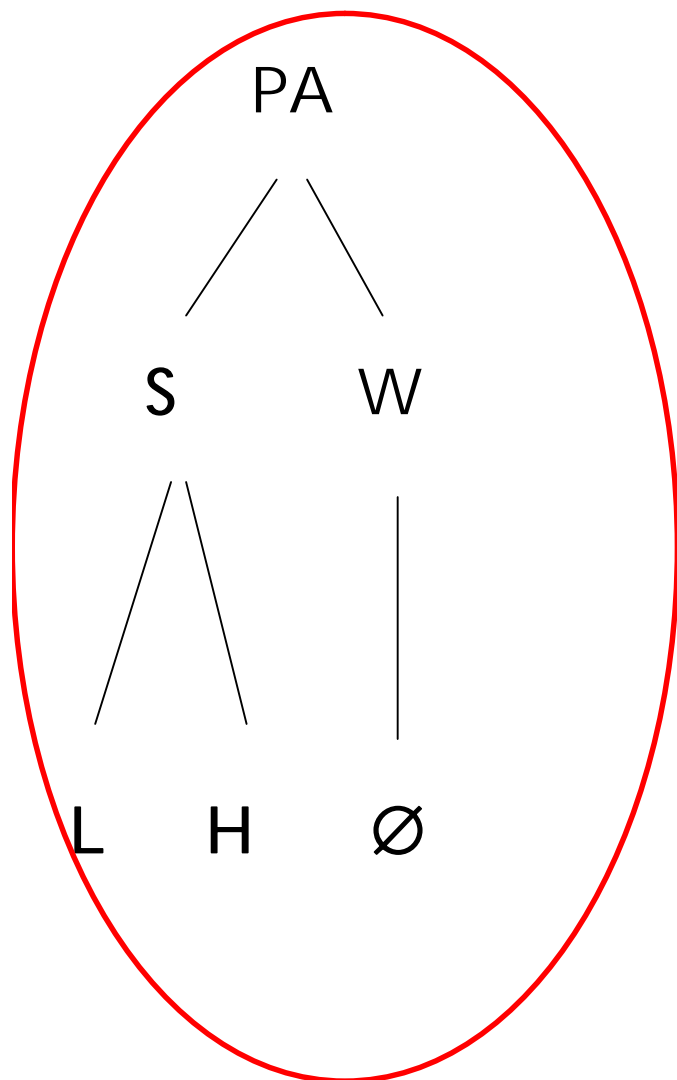


suggestion by  
Grice (1995) :  
metrical  
representation  
of tones - -  
allows for  
tritone accents

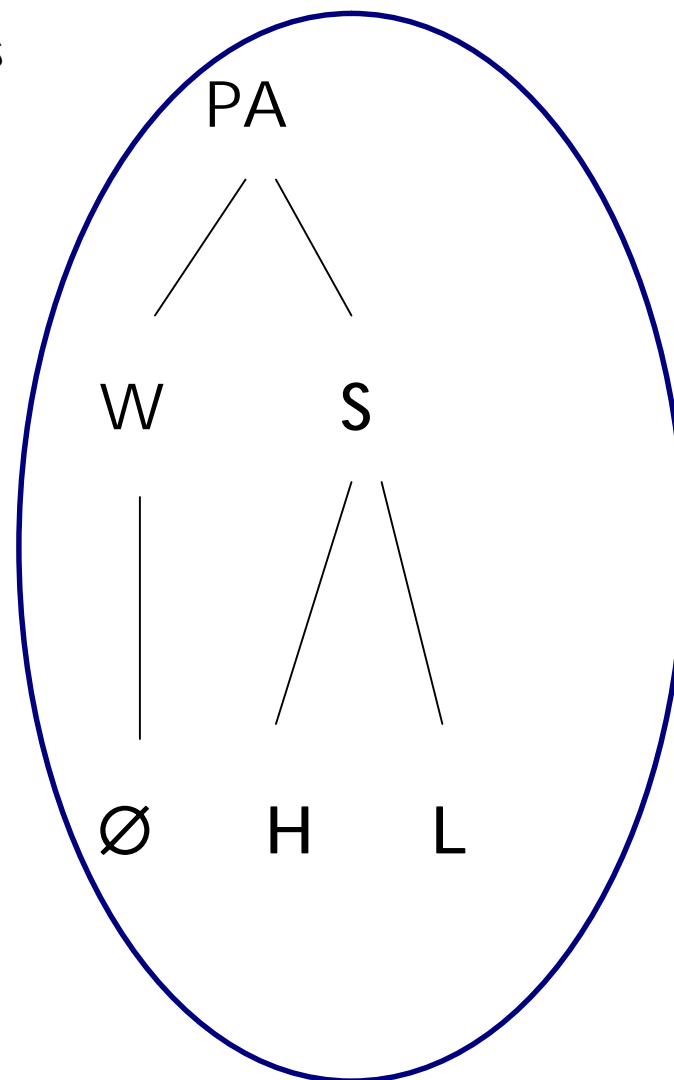




# Leading and closing accents



weak branches  
may be null





# Summary

- n focus has different prosodic correlates:
  - stronger falling than rising part of rising-falling gesture (enhanced in case of contrastivity)
  - compression of pitch range after focus
  - longer duration, more precise articulation, expanded pitch range
  - intensity (?)
- n in line with impressionistic description and Norlin's (1989) pilot study
- n reconcilable with findings by Hellmuth
  - pitch range expansion may be viewed as gradient and optional
  - early narrow information focus not consistently marked by all speakers



# Summary

representation of focus (in EA) should:

- n be based on functions
- n include a unified representation of falling structures (broad and narrow focus) – primacy of contour
- n account for independence of contour from boundary phenomena – cf. Ladd (1980: 163ff.)
- n include syntagmatic relations between accents to represent tunes or trend lines (Rifaat 2003, El Zarka 2008; cf. earlier suggestions by Ladd 1980)
- n take pitch behaviour on unaccented syllables into account



# Summary

**pitch range variation can be subdivided into**

- syntagmatic relations of relative height (in metrical component) (categorical)
- syntagmatic relation between accents (compression) is equivalent to deaccentuation in West-Germanic languages
- paradigmatic absolute expansion may be gradient and optional



Thank you!  
شکرا علی انتباهکم!



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