Graz Summer School, September, 2018
Intonation and word order, Féry

3. Intonation as correlate of phrasing. Empirical results

1. Experiments on phrasing and recursive prosodic structure

1.1. Syntax-based phrasing
Gussenhoven's (1983, 1992) proposed SAAR (Sentence Accent Assignment Rule) for the creation of 'focus domains'. Every domain created by SAAR needs a pitch accent. The last one is called nuclear accent.

(1) SAAR (1992): If focused, every predicate, argument, and modifier must be accented, with the exception of a predicate that, discounting unfocused constituents, is adjacent to an argument.
M = Modifier = adjunct

(2) a. (Why are you looking so worried?)
Jóhn kissed Máry. [A] [PA] → ÁPÁ

b. (Where's the canary?)
The cát's killed it. [AP] A → ÁPA

c. (Where's the canary?)
The cát's grácefully kílled it. [A] [M] [P] A → Á´M´PA

d. (Any news about John?)
Máry's given John a jób. [A] [PAA] → ÁPAÁ

In mini-dialogues such as in (3) and (4), there is a difference between the focus structure of predicate + argument and predicate + modifier.

(3) Predicate + argument (C = context, U = utterance)
a C: Do you live by yourself?
U: I [share a flat]$_F$ (the whole VP is focused)
b C: I hate sharing things, don't you?
U: I share [a flat]$_F$ (the argument NP is focused)

(4) Predicate + modifier
a C: Where will you be in January?
U: We will be [skiing in Scotland]$_F$ (the whole VP is focused)
b C: Where will you be skiing?
U: We will be skiing [in Scotland]$_F$ (the modifier PP is focused)

With the help of perception experiments, Gussenhoven found that the presence of an accent on the verb in addition to the expected accent on the object in (3) does not change the acceptability of the pitch accent structure, and that in both contexts. But in (4), the absence of a stress on the verb in (4) was an indicator that the verb had to be given (and thus not focused).

Truckenbrodt (1995) 'Stress-XP' in (5) predicts a similar phrasing for (3), (4) and (6). In (6)a the direct object carries a pitch accent (phrasal head) because it is an XP (syntactic phrase) and the VP does

too. In (6)b, modifier and predicate each projects an XP and need separate pitch accents. This implies a recursive structure (see Féry 2011 for this proposal), although Truckenbrodt refutes recursivity.

(5) Stress-XP: Each XP must contain a phrasal stress (where 'phrasal stress' is the head of a prosodic phrase.)

(6) a. Anna hat ((einen APFEL)$_{\Phi}$ gegessen)$_{\Phi}$. (argument + predicate)
Maria ate an apple.
b. Maria hat (im KLASSENZIMMER)$_{\Phi}$ (GEGESSEN)$_{\Phi}$. (modifier + predicate)
Maria ate in the classroom.

1.2 Relative clauses (Féry & Schubö 2010) and recursive embedding of prosodic constituents
In (7) and Figure 1, there are three high tones that delimit intonation phrases. The second part of the first embedded clause (*leben*) is reset (not downstepped) relative to the preceding high tone. F0 reset is a phonetic cue of embedding in this case. After reaching the end of an embedded ι-phrase, the F0 returns to a higher level indicating a return to a previous register level.

	H_ι		H_ι					H_ι		
(7)	(Die	Bären, (die	im	Wald,	(der	naturbelassen	ist)$_\iota$,	leben)$_\iota$	sind	friedlich)$_\iota$
	the	bears that	in.the	forest	which	nature-left	is	live	are	peaceful

'The bears that live in the forest which has been left in a natural state are peaceful.

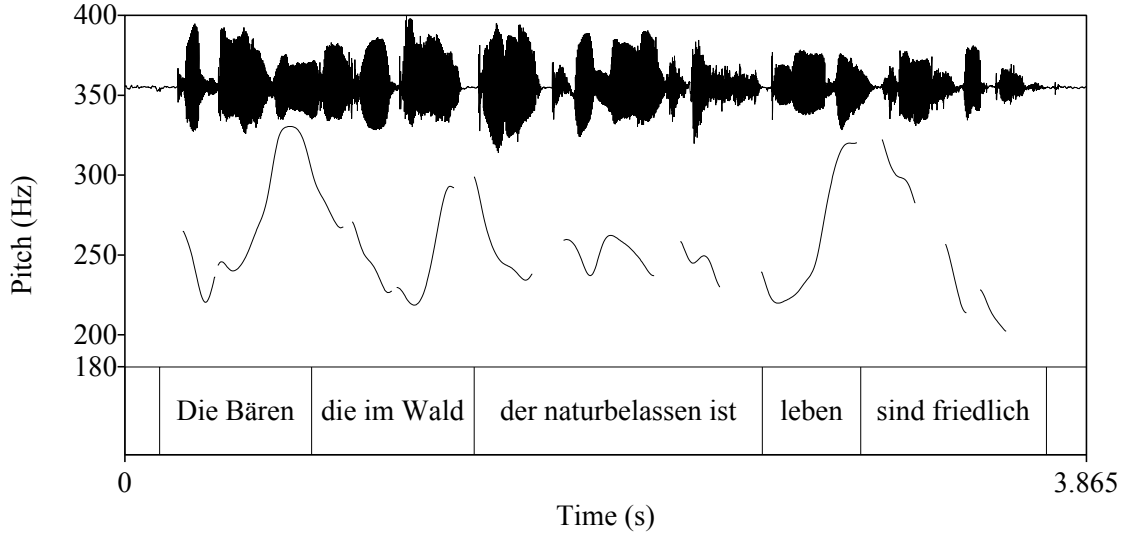
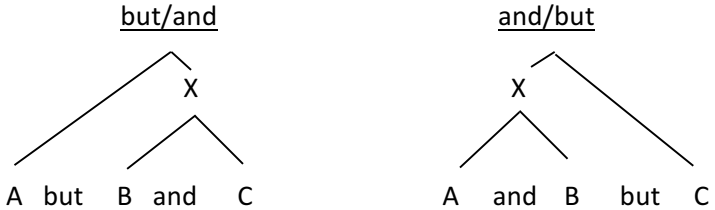


Fig. 1 An experimental sentence from Féry & Schubö (2010) with center-embedded relative clauses and upstep of the second part of the first relative clause.

1.3 Recursive intonation phrases
Ladd (1990, 1996/2008) showed that recursion in the intonation of English is not exceptional. He called recursive prosodic phrases 'compound domains' to emphasize similarity with prosodic word compounding.

(8)



(9) a. <u>but/and</u> condition [A *but* [B *and* C]$_X$]: Allan has a lot more money [*but* Warren has more popular policies *and* Ryan is a stonger campaigner]$_X$

b. <u>and/but</u> condition [[A *and* B]$_X$ *but* C]: [Allan is a stronger campaigner *and* Ryan has more popular policies]$_X$ *but* Warren has a lot more money

A, B, and C are clauses of similar rhythmic and syntactic design, each with clause-internal downstep.
Ladd's hypothesis: the different hierarchical structures induced by the conjunctions *but* and *and* are reflected in the tonal scaling, i.e. they translate into downstep, where downstep can affect larger domains. Due to the internal complexity of the clauses A, B, and C, such effects are non-local on the surface.
The entire sentence consists of a simple ι-phrase and a complex one, called X.
Not only the smaller constituents, but also entire clauses contained internal downstep (black and grey dots and lines).

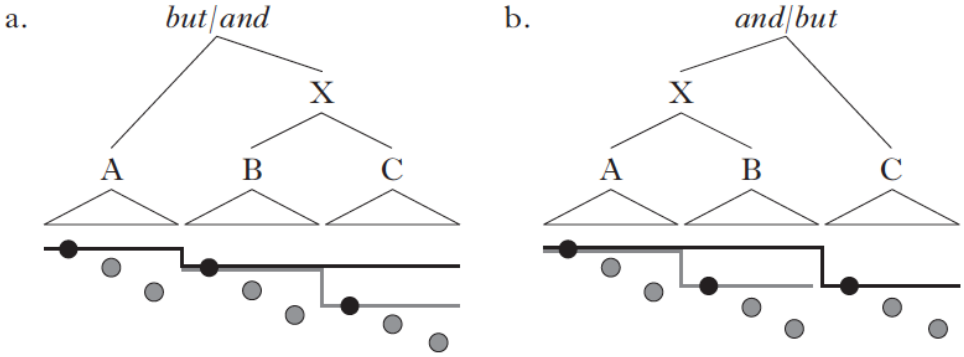


Fig. 2 Illustration of the results of Ladd (1990), from Truckenbrodt & Féry (2015)

Féry & Truckenbrodt (2005) and Truckenbrodt & Féry (2015) reproduced Ladd's results for German. The average results for the five speakers recorded in a production experiment showed a difference in the relation between the first high tones of each sentence (in Figure 3).
• In the AX (*A but (B and C)*) condition, all sentences were in a downstep relation to each other.
• In the XC ((*A and B) but C*) relation, by contrast, sentence B and sentence C started at approximately the same height.

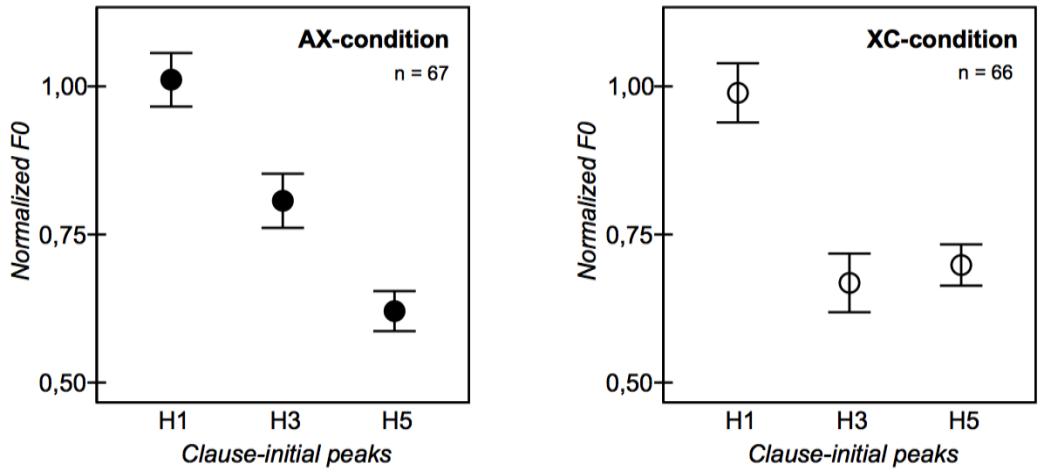


Fig. 3 Results of Féry & Truckenbrodt (2005): *but-and* (AX) condition in the left panel; *and-but* (XC) condition in the right panel

Each sentence, A, B and C, is an ι-phrase, each X (A and B or B and C) is an ι-phrase and the entire coordinated sentence is also an ι-phrase. The results in figure 3 are compatible with an embedded model of prosodic domains such as in Figure 2.
• C is scaled to the entire constituent X and thus is blind to the level of B.
If prosody were non-recursive, we would expect the two conditions tested by Ladd (1990) and by Féry & Truckenbrodt (2005) to deliver identical results.
Other researchers assuming recursive prosodic structures in experimental data: Elfner (2013), Ishihara (2004), Myrberg (2010, 2013), Wagner (2005), Féry & Ishihara (2009, 2010).

1.4 Is the prosodic phrasing sensitive for syntactic grouping and constituency
Kentner & Féry (2013) examined the phonetic correlates (F0 and duration) of embedded Φ-phrases for pitch and duration of 21 native speakers of German, see data in (10) and (11):
• a set of three names grouped in three ways,
• a set of four names grouped in six ways.

(10)	a. N1 or N2 or N3	(Nino or Willi or Mila)$_{\Phi}$
	b. (N1 and N2) or N3	((Nino and Willi)$_{\Phi}$ or Mila)$_{\Phi}$
	c. N1 or (N2 and N3)	(Nino or (Willi and Mila)$_{\Phi}$)$_{\Phi}$

(11)	a. N1 or N2 or N3 or N4	(Nino or Willi or Mila or Susi)$_{\Phi}$
	b. N1 or N2 or (N3 and N4)	(Nino or Willi or (Mila and Susi)$_{\Phi}$)$_{\Phi}$
	c. (N1 and N2) or N3 or N4	((Nino and Willi)$_{\Phi}$ or Mila or Susi)$_{\Phi}$
	d. N1 or (N2 or (N3 and N4))	(Nino or (Willi or (Mila and Susi)$_{\Phi}$)$_{\Phi}$)$_{\Phi}$
	e. ((N1 and N2) or N3) or N4	(((Nino and Willi)$_{\Phi}$ or Mila)$_{\Phi}$ or Susi)$_{\Phi}$
	f. (N1 and N2) or (N3 and N4)	((Nino and Willi)$_{\Phi}$ or (Mila and Susi)$_{\Phi}$)$_{\Phi}$

(12) One of four items:
Context: Susi and Lena always go to the pool together, and Willi also does a lot of swimming.
Question: With whom do you want to go for a swim tomorrow?
Target: With (Susi and Lena) or Willi.
Logical Form: (a $\wedge$b) $\vee$c

The production experiment is based on Wagner's (2005) similar experiment on the prosody of coordinate structures in English. His results were based on duration.
Prosody is closely mapped to syntactic structure: syntactic recursion is mirrored by prosodic recursion.

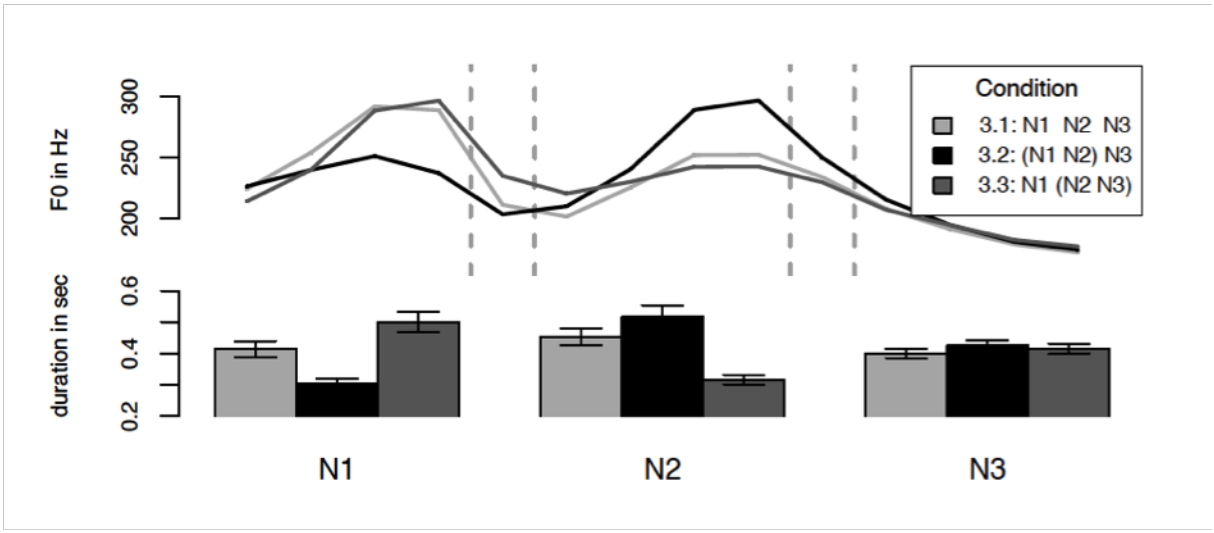


Fig.4 Results for duration and F0 of name grouping experiment

• Right-branching structures have a default F0: the right-branching structures in (10)c and (11)b,d present downstep of high tones, similar to the baseline conditions in (10)a and (11)a.
• Left-branching structures in (10)b and (11)c,e, have a marked prosody, with high boundary tones and long duration at the right edge of the groupings.

'Proximity' and 'Similarity'
(13) Proximity
a. The prosodic boundary at the terminal constituent x is weakened if the following terminal constituent y is the sister of x or dominated by the sister of x – unless x is immediately dominated by the root node of the domain under consideration.
b. (Anti-Proximity): The prosodic boundary at the terminal constituent x is strengthened if the following terminal constituent y is not a sister of x.

(14) Similarity
The prosodic boundary at the terminal constituent x is strengthened if a sister constituent of x is complex.

(15) The Left hand side/ Right hand side Boundary Hypothesis (LRB, Watson and Gibson (2004))
The likelihood of an intonational boundary at a word boundary is a function of:
a. the size of the most recently completed constituent and
b. the size of the upcoming constituent if it is not an argument of the most recent head.

Wagner (2005) proposes an alternative model that relates the strength of prosodic boundaries to syntactic levels of embedding rather than the size of adjacent constituents.

(16) Scopally Determined Boundary Rank (SBR, Wagner (2005)):
If Boundary Rank at a given level of embedding is n, the rank of the boundaries between constituents of the next higher level is n+1.

2. Experiments on tonal scaling and information structure

Féry & Kügler (2008) Scaling of accents in a single Intonation Phrase with different new-given structures.

(17) Hypotheses:
All-new sentences: All pitch accents are downstepped relatively to each other
Narrow focus: Boosting of the pitch accent
Givenness: Lowering of the pitch accent prenuclearly
Postnuclear deletion of accents

(18) a. Context: Warum haben sich die Tiere gefreut? 'Why were the animals happy?'
b. Target: [Weil der Hammel den Rammler eingeladen hat.]$_F$
'Because the wether has invited the buck'
N A V (All-new sentences)
(19) a. Context: The wether wanted to introduce the buck to the lion. Why didn't he do it?
b. Target: Weil der Hammel den Rammler [dem Hummer]$_F$ vorgestellt hat.
'Because the wether introduced the buck to the lobster.'
N A **D** V (focus on the dative complement)

Three parameters were systematically varied:
1. Number of arguments: between one and three:
1 Nominative-verb (NV)
2 Nominative-accusative-verb (NAV) or nominative-dative-verb (NDV)

3 Nominative-dative-accusative-verb (NDAV)

2. Word order: the order of the arguments was systematically varied.

3. Given-new status of the arguments and the verb:

2340 sentences uttered by 18 female speakers. Altogether 2277 sentences were retained for analysis.

All-new sentences showed variation

- final verb (participle) was accented or not
- downstep pattern was frequent
- upstep on the preverbal constituent was an alternative

Expected effects due to narrow focus

- Postnuclearly, accents on given constituents are deleted.
- Prenuclearly, the accents are preserved. But givenness lowers the pitch values
- Narrow focus raises the pitch values

Other effects are not explainable by just narrow focus, newness and givenness: tones affected other tones

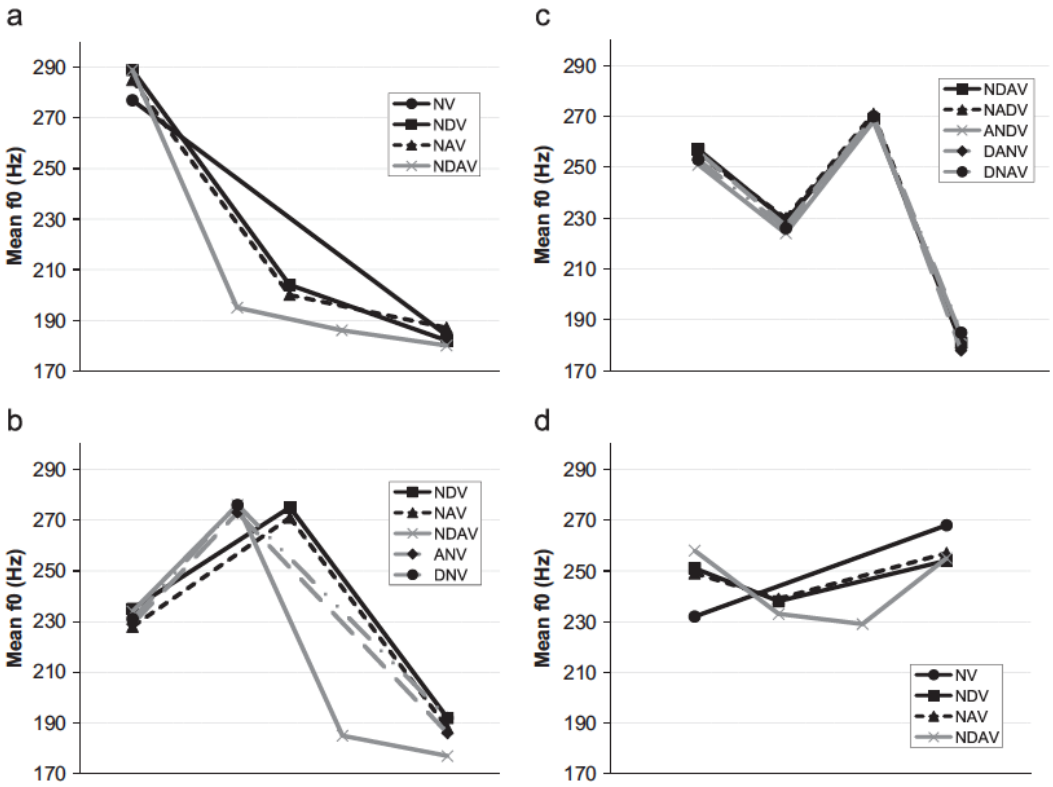


Fig. 5. Mean f0 of narrow focus on different constituents. (a) Narrow focus on the first argument. (b) Narrow focus on the second argument. (c) Narrow focus on the third argument. (d) Narrow focus on the verb.

Prosodic phrasing is not concerned. Prosodic phrasing just maps syntax. Every constituent forms a Φ-phrase and the verb is integrated into the preceding phrase (or not).

(20) a. (Weil der HAMMEL)$_{\Phi}$ (den RAMMLER eingeladen hat)$_{\Phi}$
b. (Weil der RAMMLER)$_{\Phi}$ (dem REIHER)$_{\Phi}$ (den HUMMER vorgestellt hat)$_{\Phi}$

(21) a. (Weil der HAMMEL)$_{\Phi}$ (den RAMMLER eingeladen hat)$_{\Phi\,F}$
b. (Weil der HAMMEL)$_{\Phi}$ ((den Rammler eingeladen hat)$_{\Phi}$)$_{G}$

Φ-phrasing is not changed because of givenness.

In Kügler & Féry (2017), post-nuclear deaccenting was studied in 187 sentences like (22) in three length (one, two or three post-verbal arguments) and six items, spoken by 11 speakers.

(22) Context: Did the lobster introduce the sheep to the heron?
Nein. GEZEIGT$_F$ hat der Hummer den Hammel dem Reiher.
no. showed has the.$_{NOM}$ lobster the.$_{ACC}$ sheep the.$_{DAT}$ heron
'No. The lobster showed the sheep to the heron.'

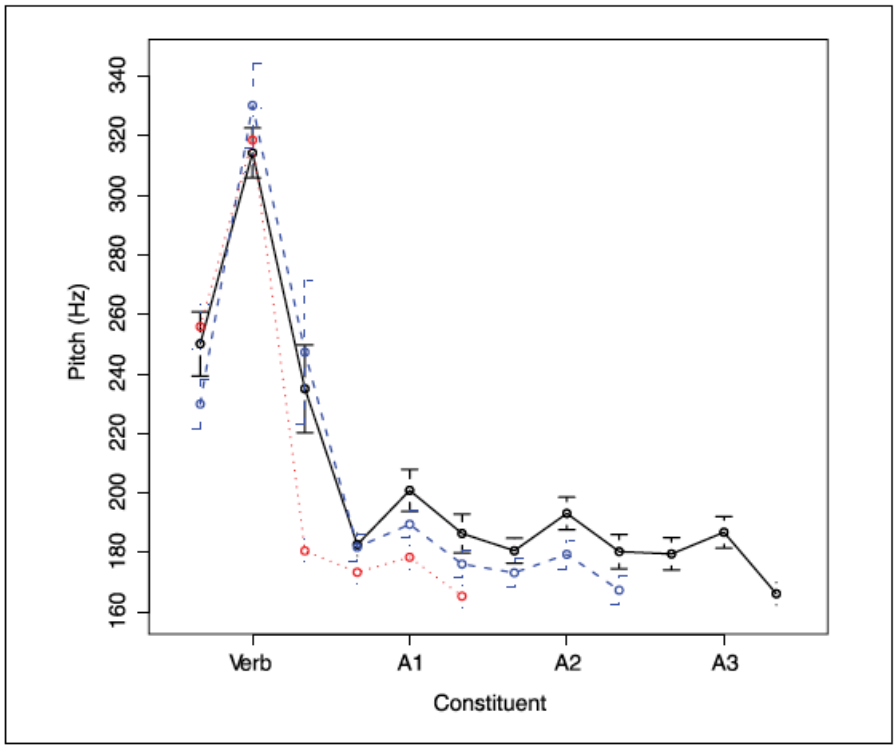


Fig.6 Comparison of the averaged values of the three sentence lengths for all data: one-argument (dotted line), two-argument (dashed line) and three-argument sentences (solid line).

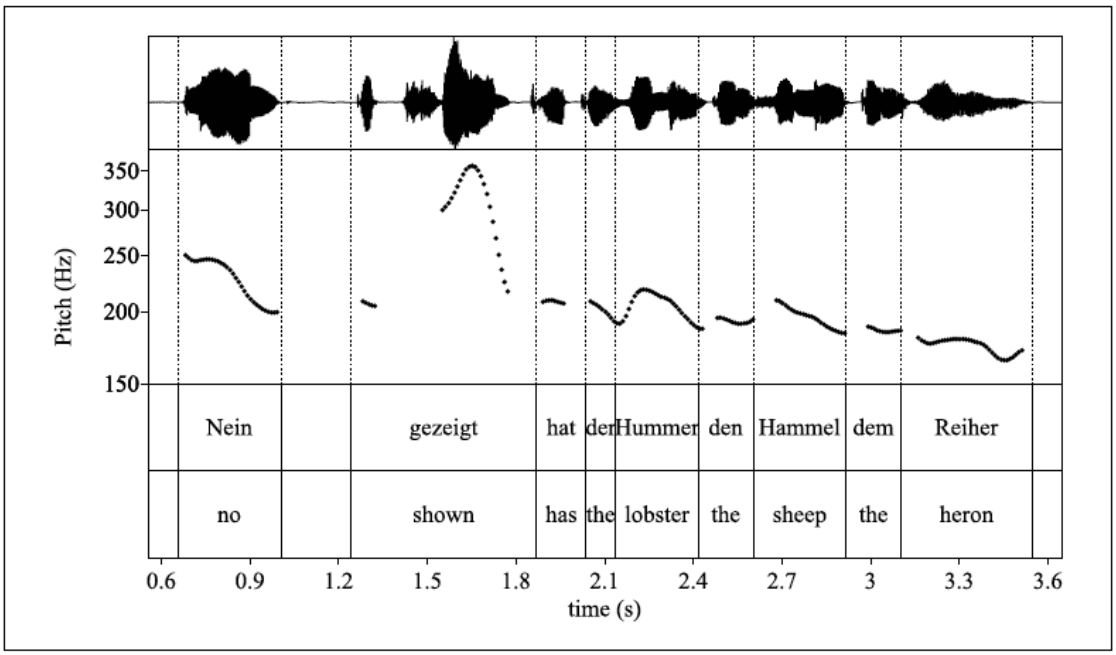


Fig.7 A pitch track of a sentence with three post-focal arguments

There is no reason to assume dephrasing of the post-focal material. The data are more in line with a structure as in (18) below.

	(x)	ι-phrase
	(x) (x) (x) (x)	Φ-phrase
	(x) (x) (x) (x)	ω-word
(18)	(VORgestellt$_F$)$_\Phi$ (hat der HUMmer)$_\Phi$ (den REIher)$_\Phi$ (dem HAMmel)$_\Phi$	

The reason for the relatively flat

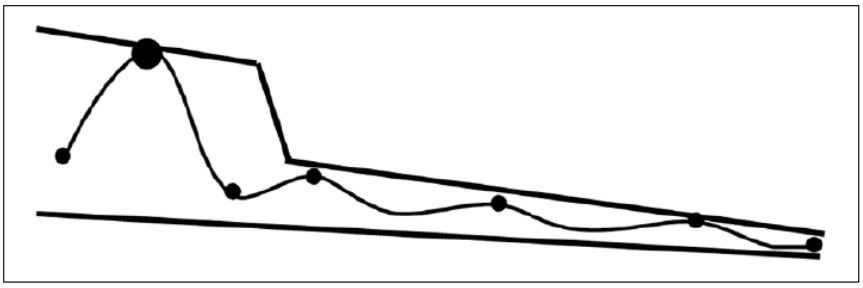


Fig.8 A pitch track

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