

Prosodic Encoding of Focus and Sentence Mode in L2

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Introduction

- Encoding of focus and sentence mode central tasks for prosody.
- Systematically collected and analyzed L2 data rare (e.g. Chen & Mennen, 2008; Jilka, 2000; Mennen, 2004); concentrating on aspects of fundamental frequency and duration.
- Models L2 speech prosody production very vague (e.g. de Bot, 1992; Xu, 2005)
- Specific L2 patterns almost exclusively explained by interferences (transfer from native language, bi-directional for some learners)
- However, prosody perception experiments have shown that the interpretation of some patterns in pseudo-words is independent from the native language of the learners (Gussenhoven & Chen, 2001)
- Observation-based theories suggest cautiously (quasi-) universals (Bolinger, 1989: "Prosody is mainly encoding affects"; Gussenhoven, 2004: "Biological Codes")
- If there is an "emergence of the unmarked in second language phonology" (Broselow & al., 1998), do we find it in L2 prosody, too?
- Is there a reason why the "unmarked" has not been stated explicitly so far in L2 production (level of measurement, just not looking for, there IS no evidence)?

• If second language prosody is different from:

L1	L - target	Implication (Hypothesis)
No	Yes	No acquisition: Full transfer from L1
Yes	No	Acquisition: New patterns or pattern-meaning associations are learned
No	No	Interaction: Bi-directional transfer, approximation from L1 to L-target
Yes	Yes	Pattern unattested in L1 and L-target. Explainable by potential universals?

• English, German, and "Universal" tendencies for Sentence Mode and Prominence Encoding

Function	Source (Language)	Prosodic Encoding Pattern
Question-Declarative-Distinction	English	Certain proportion of finally falling questions, depending on question type and region of origin of speakers: up to an amount that final contour is not prosodically different from declaratives
	German	Only final rise reported for questions, independent of type
Prominence Encoding	Frequency Code	Questions have higher F0, especially towards the end of a sentence
	English	Mainly encoded by increased duration and intensity, F0 rather marginal (Kochanski et al. 2005). Position dependent "deaccentuation"
	German	Mainly encoded by increased duration and F0, intensity not relevant (Elsner, 2000)
Effort Code	Higher pulmonal effort → increased intensity, F0, duration	

Procedure

Subjects

- 16 female speakers with restrained region of origin for each speaker group:
- **Experiment 1:** native English speakers (Manchester, England): English sentences
- **Experiment 2:** native German speakers (Leipzig, Saxony): German sentences
- **Experiment 3:** native German speakers (Leipzig, Saxony): English sentences

Materials

- Dialogs eliciting 24 different short SVO sentences with monosyllabic constituents
- First, declarative sentence denying truth of one of the three constituents (backwards related corrective contrast on subject, verb, or object of the sentences)
- Then, identical echo-question
- High between-languages similarity (proper names, no word-accent differences)
- Example (corrective contrast on object)

A: Who was the girl that Fred kissed at the party last night. Was that Florence?
 B: No, that wasn't Florence. Fred kissed Sue!
 A: What? Fred kissed Sue? I can't imagine ...
 B: ...

Design

- Each speaker uttered corrective contrast in each of the three positions in each of the two sentence modes plus one filler condition with wide focus (What happened last night?) in declaratives and echo-questions → 24 / (4*2) = 3 measures per subject for each condition

Preprocessing

- Recordings of critical sentences extracted
- Annotation of perceived position of sentence accent
- Transcription of contours as sequences of L(ow) and H(igh) tones
- Measurement of six acoustic properties on each syllable of the critical sentences with PRAAT
- Duration ratio: duration of constituent / duration of the whole sentence
- F0 maximum
- Mean F0
- Pitch range
- Alignment of F0 peak within syllable
- Intensity ratio: mean intensity of syllable / mean intensity of the whole sentence

References

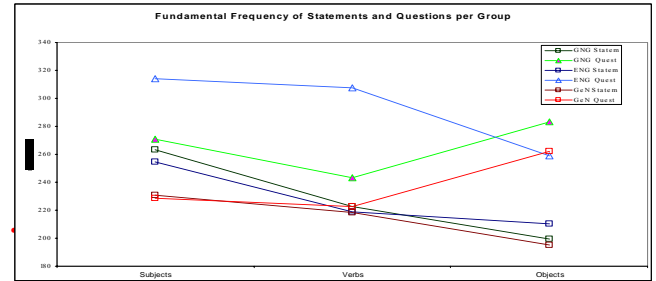
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Results Sentence Mode Encoding

- Clearly domain of fundamental frequency
- German native speakers use final rise to encode questions in German and English; English natives prefer falling contour at the end

	Summed percentages of contours on the object of the sentences					
	English native		German native		German English	
	Statements	Questions	Statements	Questions	Statements	Questions
low / falling	77	73	95	3	87	14
high / rising	23	27	5	97	13	86

- English natives (ENG) use higher register from the begin of the questions on, Germans (GeN) do not for German, German learners of English (GNG) in-between



Results Contrast Encoding

Perceived main sentence accent

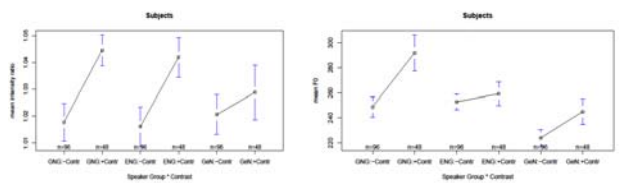
- Perceived main sentence accent generally shifted to place of contextually intended contrast (between 77% and 96% for statements, and 38% to 98% for questions). Difficulties especially for contrast on verbs in questions.

Correlated contours

- Same inventory of contours for all three speaker groups (no new contour to learn)
- Contrast related tones:
 All speaker groups: Nothing noticeable in subject position;
 Increased proportion of rise (LH) instead of fall (HL) for contrasted verbs
 German native speakers increase proportion of complex rise-fall (LHL) for contrasted objects in statements independently of language spoken, and more than English native speakers
- Generally: distribution of tones for German English is very similar to native German

Acoustic correlates

- No significant differences between contrasted and non-contrasted syllables in questions uttered by native speaker groups, although shift of main accent is mostly perceived: rare for L2
- In statements complex statistical outcome:
 analyses with mixed linear models
 $Value_of_parameter = Contrast(Yes/No) * SpeakerGroup(GNG/ENG/GeN) + (1|SpkID) + (1|SentenceID)$
- L2 encoding (interaction Contrast*SpkGroup) significantly different from one group, both groups, or none. If there is an interaction, the coefficient is negative, thus, the differences of +/- contrast are stronger than the respective native speaker group



- Weights of acoustic parameters for each speaker group:

GeN				ENG				GNG			
Rank	Subject	Verb	Object	Rank	Subject	Verb	Object	Rank	Subject	Verb	Object
1	Pmax	AlignPmax	Pmean	1	DurRa	AlignPmax	IntRa	1	DurRa	DurRa	DurRa
2	DurRa	DurRa	DurRa	2	IntRa	Prange	DurRa	2	Pmean	IntRa	Pmean
3		Pmean		3		DurRa		3	IntRa	Pmean	IntRa
4		Pmax		4		Pmean		4			Pmax
5		Prange		5		Pmax					
				6		IntRa					

General Discussion

- Simplified two-levels (L or H) AM – transcription suggests full transfer from L1 for sentence mode and contrast encoding: too coarse-grained!
- Fundamental frequency data for **sentence mode encoding** may be interpreted as approximation to L-target with strong interferences from L1
- Analyses of a number of acoustic correlates for **contrast encoding** show that L2 speakers use more correlates more consistently than L1 or L-target speakers.
- Hardly to explain by interferences as direction (L1/L-target) is dependent on position and parameter, plus some effects that were not attested with any native speaker group
- Rather general strategy of a maximization of contrasts between sentence modes and contrasted / non-contrasted syllables. Pattern / meaning relation fully compliant with predictions of "Biological Codes"