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# L1 intonational categories as “perceptual attractors” during L2 imitation

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## INTRODUCTION

○ In L2 learning, native (L1) phonological representations act as “perceptual attractors” to which similar non-native sounds are assimilated [1, 2];

○ Competition with the inventory of the language/dialect of origin modulates segmental imitation by selective processes [3]

○ Phonological properties of a speech sound replace its phonetic properties with the passing of time [4], e.g., by matching to exemplars or by rehearsal of articulatory programs [1, 5].

### Intonation?

○ Speakers reproduce the phonological form of an utterance, not its phonetic details [6];

**BUT:** When imitating non-native dialects, the f0 contour is partly modified to approximate the target dialect [7].

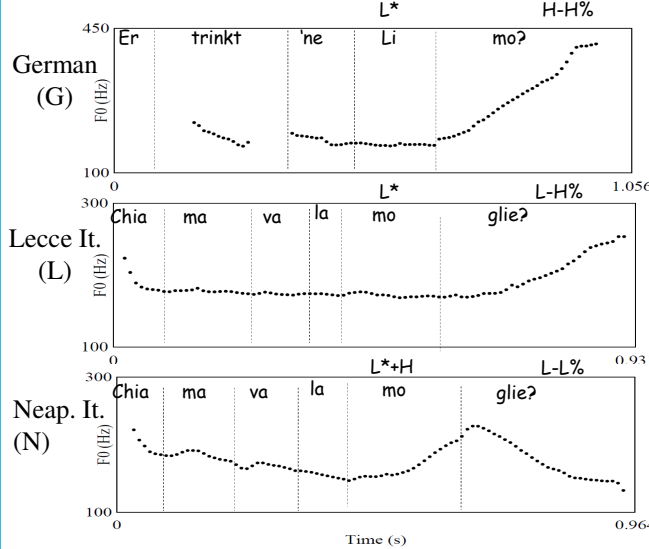
### Questions (Q) [8, 9]

Language	Intonational Category	Description
(Northern Standard) German	L* H- H%	Steep rise right after the f0 valley
Lecce Italian	L* L- H%	Shallow rise, late rise onset
Neapolitan	L*+H L-L%	f0 Rise-fall

### Hypotheses

**H1:** Lecce speakers will be less accurate in imitation since they perceive German contours as variants of their native dialect contours

**H2:** Less accurate reproduction when imitation is delayed/rehearsal is reduced because of a decay of detailed F0 memories.



## Wavelet-based functional mixed model [10]:

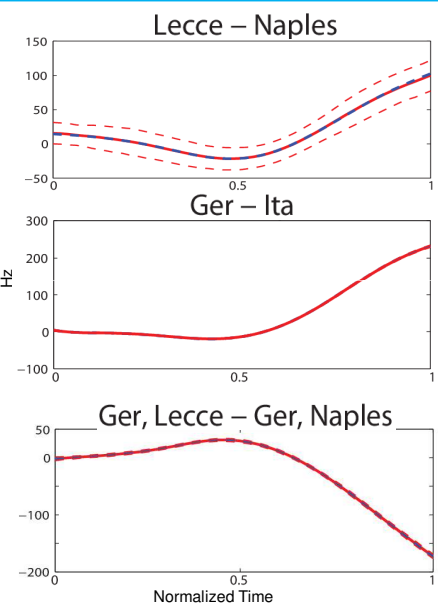
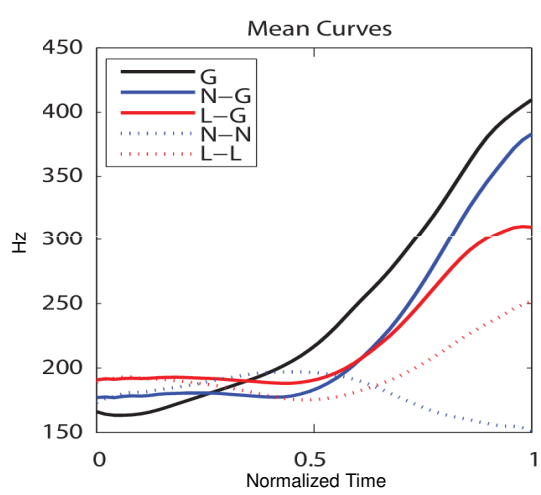
○ Evaluate effects of experimental factors on the f0 contours within the target words:

- (1) Discrete Wavelet Transform (DWT) to obtain a set of wavelet coefficients;
- (2) Markov chain Monte Carlo simulation to get the posterior samples for quantities in the wavelet space version of the functional mixed model;
- (3) Inverse DWT to convert these quantities back to data space.

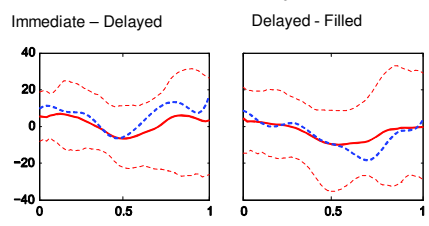
- Fixed factors: Variety, language, memory, repetition;
- Full random structure.

→ Capture changes of f0 in time without assumptions about f0 shape.

## 1. Language interference RESULTS



## 2. Memory



- Neapolitans better imitators than Lecce Italians:
  - Shift from rise-fall to rising f0 curve in Neapolitan;
  - Final f0 rise shallower and lower in Lecce It.
- No effects of memory

## CORPUS & METHODS

○ Shadowing:

Baseline Task	Main Task
Prendeva la nave? Did s/he travel by ship?	Er malt 'ne Blume? Does he paint a flower?
Guardava il mare? Did s/he look at the sea?	Er trinkt 'ne Limo? Does he drink a lemonade?
Stringeva la mano? Did s/he shake hands?	Sie isst 'ne Möhre? Does she eat a carrot?
Spalava la neve? Did s/he shovel snow?	Er baut 'ne Mühle? Does he build a mill?
Brucciava il legno? Did s/he burn wood?	Er mag Salami? Does he like peperoni?
Chiamava la moglie? Did s/he call the wife?	Er spielt Violine? Does he play violin?
Comprava la lana? Did s/he buy the wool?	Sie haben 'ne Waage? Do they have a balance?
Cambiava lavoro? Did s/he get a new job?	Er sucht Maroni? Does he look for chestnuts?

○ Imitators with no knowledge of German

○ “Memory” conditions: Speaking onset at the end of Q (Immediate), after a silent pause of 4 s. (Delayed) or an answer of 4 s. to Q (Filled).

8 Qs \* 2 Tasks \* 3 Memory Conditions \* 16 Imitators (8 Lecce + 8 Neap.) \* 5 Repetitions = 3840 obs..

## DISCUSSION

- **Language interference:**
    - Neapolitan: Imitation of German Qs not mediated by grammar -> + attention to acoustic details;
    - Lecce it.: Phonological ambiguity -> Speakers rely on phonetic implementation rules of their own variety.
  - **No memory effects:**
    - no rehearsal for continuous f0?
    - too simple task?
- Increase cognitive load by increasing linguistic (i.e. syllabic) complexity (in progress)

## CONCLUSION

- Similarly to the segmental level, intonation is anchored by native prosodic representations.
- Functional mixed models: New paradigm for exploring intonation.

## References

[1] Goldinger, S. D. (1998). Echoes of echoes? An episodic theory of lexical access. *Psychological Review*, 105, 251-279.  
 [2] Best, C.T. (1995). A direct realist perspective on cross-language speech perception. In W. Strange (Ed.), *Cross-language Speech Research*, 167-200.  
 [3] Nielsen, K. (2011). Specificity and abstractness of VOT imitation. *Journal of Phonetics*, 39(2), 132-142.  
 [4] Cowan, N. (1984). On short and long auditory stores. *Ps. Bull.*, 96 : 341-370.  
 [5] Baddeley, A. (2002). Is working memory still working? *Eur. Bull.*, 7: 85-97.  
 [6] Cole, J. and Shattuck-Hufnagel, S., (2011) "The phonology and phonetics of perceived prosody: What do listeners imitate?". *Proc. Interspeech*.  
 [7] Gersl, J. (2012) Dialect Adaptation and Two Dimensions of Tune. *Proc. Speech Prosody*.  
 [8] Grice, M. & Baumann, S. (2002). Deutsche Intonation und GToBI. *Linguistische Berichte*, 191: 267-298.  
 [9] Savino, M. (2012). The intonation of polar questions in Italian: Where is the rise? *JIPA*, 42(1): 23-48.  
 [10] Morris, J. and Carrol, R. (2006). Wavelet-based functional mixed models. *Journal of the Royal Statistical Society Series B*, 68 (2): 179-199.