A CAPT tool for training and research on lexical stress errors in German

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Introduction

Computer-Assisted Pronunciation Training (CAPT) can:

- automatically analyze and diagnose pronunciation errors
- offer individualized feedback on errors and how to correct them
- complement traditional classroom-based language study (which typically neglects pronunciation teaching)
- encourage independent study

This poster describes upcoming work towards the development of a CAPT system targeting native (L1) French speakers learning German as a foreign language (L2).

Context: M.Sc. thesis, related to ongoing Franco-German project *Individualized Feedback for Computer-Assisted Spoken Language Learning* (IFCASL) [3].

Aim: Engineer a prototype German CAPT system offering L1 French speakers feedback on one type of pronunciation error.

The work has 3 main research questions, outlined below.

1. Which error should the system address?

Goal: Determine which type of L2 German pronunciation errors is best addressed by a CAPT system.

Criteria for error selection: An error is a good CAPT target if it...

- is frequently produced by L2 speakers (with French as L1)
- affects (perceived) intelligibility of learner's speech
- can be reliably detected/diagnosed automatically

Proposed methods for selecting target error type(s):

- Analysis of subset of IFCASL corpus (spoken L1/L2 German) [3]
- Survey of past research on L2 intelligibility (e.g. [2])
- Survey of past research on CAPT/L2 speech processing (e.g. [1])

Hypothesized errors fitting the criteria:

- Lexical accent errors [1,2], such as:
  - Stress on wrong syllable (e.g. [ˈapʁɪl] vs. [aˈpʁɪl])
  - No distinction between stressed/unstressed syllables
- Vowel quality and/or quantity errors, e.g. [i] for /ɪ/ or /iː/

2. How can the error be automatically diagnosed?

Goal: Given target error, determine best technique for automatically detecting this error in L2 speech.

Criteria for technique selection: Automatic diagnosis must be...

- reliable (i.e. of reasonably high accuracy)
- fast on modern consumer-grade hardware (to generate diagnosis and feedback within seconds)

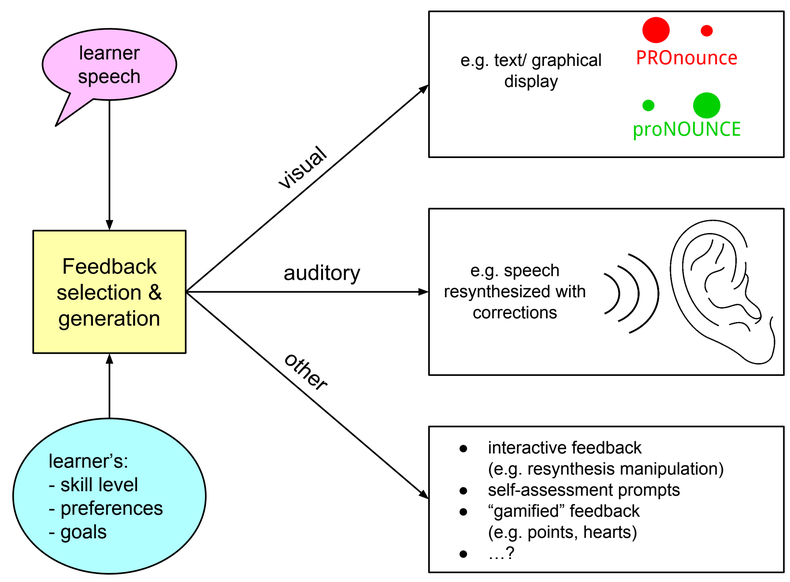
Proposed methods for determining best technique:

- Survey of research into automatic processing of this phenomenon
- Comparison of existing techniques
- Experimentation with new techniques (if needed)

3. What feedback can/should learners receive?

Goal: Given target error and processing technique(s), develop one or more methods to model mastery and deliver feedback. Ideally:

- develop multiple feedback options
- determine best feedback type dynamically based on learner-specific factors (e.g. skill level)



Conclusion

Outcome: Prototype CAPT system for the selected error type, implementing the chosen analysis and feedback method(s).

If successful, the prototype will be integrated into the more comprehensive CAPT system developed in the IFCASL project.

Intended contribution: Survey and build upon existing research on automatic diagnosis and correction of errors in L2 German speech.

Possible extension: Evaluate the effect of given feedback type(s) on:

- Production/mastery of the error
- Satisfaction with the prototype CAPT system
- Motivation to use the system

References

[1] Bonneau, A. and Colotte, V. 2011. Automatic Feedback for L2 Prosody Learning. In *Speech and Language Technologies*. Ivo Ipsic, ed. InTech.

[2] Hirschfeld, U. 1994. *Untersuchungen zur phonetischen Verständlichkeit Deutschlernender.* Forum Phoneticum, 57.

[3] Trouvain, J., et al. 2013. "Designing a bilingual speech corpus for French and German language learners". *Proc. Corpus et Outils en Linguistique, Langues et Parole*, Strasbourg, pp. 32-34.