



ASR-based corrective feedback on pronunciation: does it really work?

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Outline

- Background & problem
- Goal of present study
- Experiment
- Conclusions



Background and problem

Computer Assisted Pronunciation Training (CAPT)

ASR-based CAPT:

can provide automatic, instantaneous, individual feedback on pronunciation in a private environment

But ASR-based CAPT suffers from limitations.

Is it effective in improving L2 pronunciation?

Very few studies with different results.



Goal of this study

- ⇒ To study the effectiveness and possible advantage of automatic feedback provided by an ASR-based CAPT system.



ASR-based CAPT system: Dutch CAPT

Target users

adult learners of Dutch with different L1's
(e.g. immigrants)

L1's

Pedagogical goal

improving **segmental** quality in pronunciation



Dutch CAPT: feedback

Content: focus on problematic phonemes,

11 'targeted phonemes': 9 vowels and 2 consonants

Criteria

Error detection algorithm:

based on GOP method (Witt & Young 2000)



Video



PRGO

Sounds Listen to the whole dialogue first. Then click on the record-button and record your role: you are the female speaker. Remember that if you are the first speaker, you must start speaking immediately.

Play the whole dialogue

Ik heb iets voor je gekocht. Hier.

Dank je wel.

Het staat fantastisch. Het staat goed bij je broek.

Vind je echt?

Ja, natuurlijk.

You had problems with the red sound(s). Listen again to the example and try again.

ik heb iets voor je gekocht hier

Video

PRGO

Session

Sounds Listen to one word by clicking on its audio-button. Record the word by clicking on the record-button. Do this for EACH word in the exercise.

man stuk

maan stug

Well done! Try the next utterance.

man



Dutch CAPT

Gender-specific, Dutch & English version.

4 units, each containing:

1 video (from *Nieuwe Buren*) with real-life + amusing situations

+ ca. 30 exercises based on video: dialogues, question-answer, minimal pairs, word repetition

Sequential, constrained navigation: min. one attempt needed to proceed to next exercise, maximum 3



Method: participants & training

Regular teacher-fronted lessons: 4-6 hrs per week

a) Experimental group (EXP): n=15 (10 F, 5 M)
Dutch CAPT

b) Control group 1 (NiBu): n=10 (4 F, 6 M)
reduced version of Nieuwe Buren

c) Control group 2 (noXT): n=5 (3 F, 2 M)
no extra training

Extra training: 4 weeks x 1 session 30' – 60'

1 class – 1 type of training



Method: testing

3 analyses:

1. Participants' evaluations: questionnaires on system's usability, accessibility, usefulness etc.

2. Global segmental quality: 6 experts *rated* stimuli on 10-point scale (pretest/posttest, phonetically balanced sentences)

3. In-depth analysis of *segmental errors*: expert annotations



Results: participants' evaluations

Positive reactions

Enjoyed working with the system

Believed in the usefulness of the system



Results: reliability global ratings

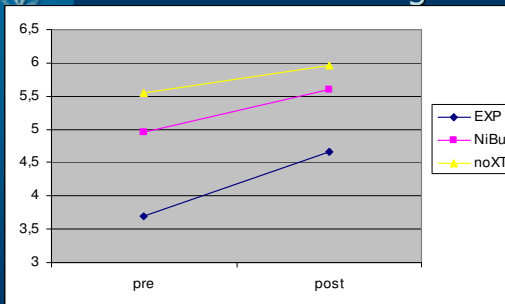
Cronbach's α :

Intrarater: .94 – 1.00

Interrater: .83 - .96



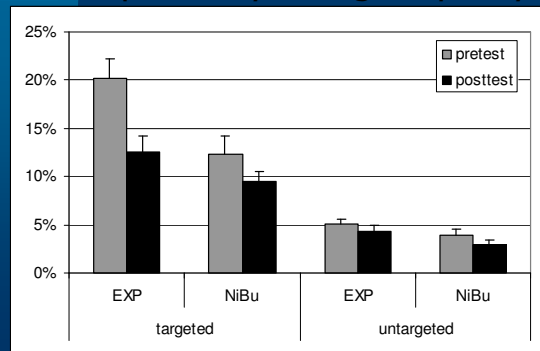
Results: Global ratings



All 3 groups improve (mean improvement)
EXP improved most



In-depth analysis segm. quality



Conclusions

- Participants enjoyed Dutch CAPT.
- ASR-CAPT seems efficacious in improving pronunciation of targeted phonemes.
- Global ratings are appropriate measure because CAPT should ultimately improve overall pronunciation quality.
- Fine-grained analyses also useful.



The end

Questions?



Possible improvements

- Give feedback on more phonemes
More targeted systems for fixed L1-L2 pairs.
- Give feedback on suprasegmental

- Increase sample size
- Increase training intensity
- Match training groups: L1's, proficiency, etc.



The end

Questions?