











**Developing a Digital Training System for Acquired Dysarthria: the** *ISi-Speech* **Project** 

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- School of Rehabilitation Sciences, Department of Language and Communication, TU Dortmund University
  - Speaking is a key factor for successful communication and participation in society
  - Speech motor impairments, such as dysarthria, have a significant impact on everyday communication due to reduced speech intelligibility
  - Neurologic diseases, e.g. stroke or Parkinson's disease, are often associated with dysarthria
  - Health insurance often covers only a limited set of treatment units for speech therapy, e.g. two sessions a week
  - Sustainable effects for treatment of dysarthria have primarily been shown using intensive treatment approaches like LSVT LOUD® (e.g. Fox, Ebersbach, Ramig, & Sapir, 2012)
  - Increase of frequency often fails due to a lack in human resources or cost coverage

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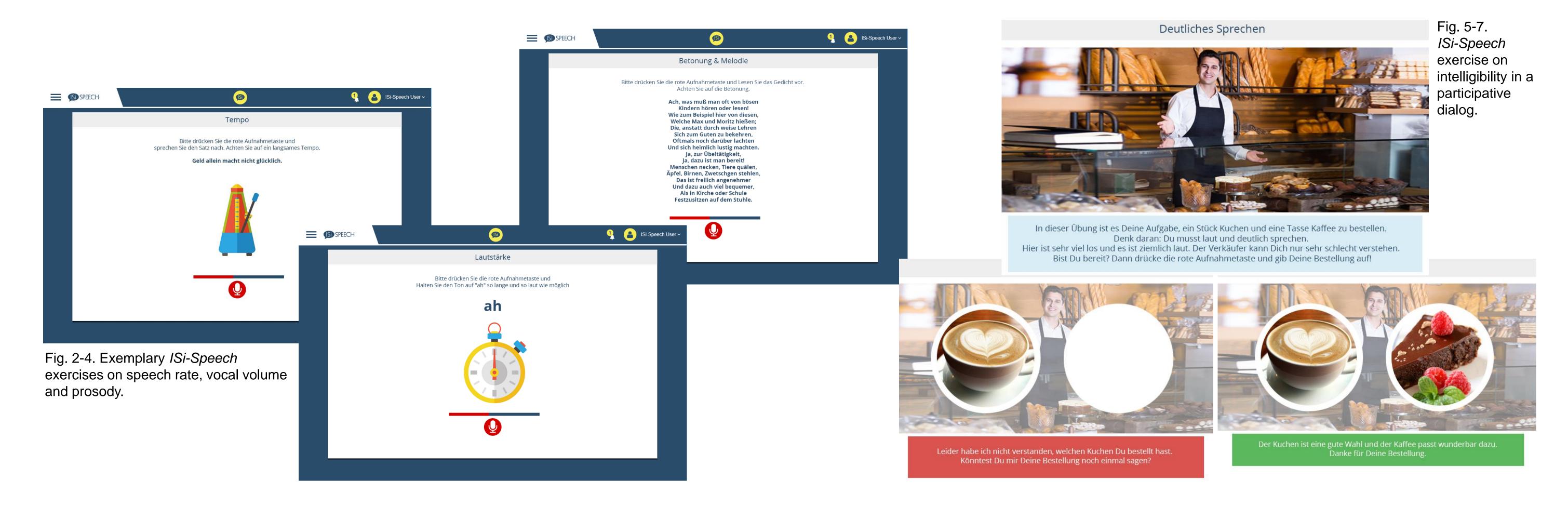


- This is where **technology** comes into play
  - in the interaction with a speech pathologist
  - as a supplement tool for autonomous training
- In autonomous speech training, feedback on correct execution is of utmost importance
- Objective and motivating feedback may nowadays be based on **automatic speech recognition**, helping to boost awareness of intelligibility limitations and optimizing speech performance

Fig. 1. *ISi-Speech* is designed as a training system to be worked on with personal computer, laptop, tablet pc or smartphone.

- > Joining efforts to develop a digital training system for people with dysarthria in an interdisciplinary team of engineers for speech signal processing and informatics, media designers and researchers from the fields of speech pathology and psychology
- > Challenge is to develop an automatic speech recognition system applicable to distorted speech and to integrate this system into a speech therapy application that incorporates the motivational potential contributing to frequent and autonomous usage
- The *ISi-Speech* training system covers evidence-based and best clinical practice exercises for treatment of articulation, prosody and pitch range, speech rate, vocal volume, and resonance.
  - Articulation: repetition and reading tasks, clear and exaggerated articulation (e.g. Park, Theodoros, Finch, & Cardell, 2016) of words, phrases, sentences and texts
  - **Prosody**: metrically controlled sentences, poems or lyrics, rhythmic entrainment exercises (cf. Späth et al., 2016), utterances with specific empathic stress patterns
  - **Speech rate**: virtual metronome, pacing board
- augmented vocal volume & vocal vigilance

Treatment options with ISi-Speech are numerous, but each patient shall focus on only one to two variables at a time to maximize outcome (Atkinson-Clement, Sadat, & Pinto, 2015).





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