



**NVFW**  
Nederlandse Vereniging voor  
Fonetische Wetenschappen

# **Dag van de Fonetiek 2018**

Vrijdag 21 december 2018

VOC-zaal, Bushuis

Universiteit van Amsterdam

Kloveniersburgwal 48

## KEYNOTE

### **Speaker comparisons in the forensic context Scientific evidence or subjective opinion?**

*Tina Cambier-Langeveld  
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In forensic speaker comparisons, speech samples from an unknown speaker (relating to a crime) must be compared to speech samples from a suspect, in order to investigate whether or not these samples were produced by the same speaker. Forensic casework of this kind is typically performed by phoneticians.

In this presentation we will take a close look at the present methodology in forensic speaker comparisons and recent developments in this field. This keynote will address the question whether this type of evidence meets the criteria. Ideally, forensic evidence should be based on objective and verifiable facts rather than subjective opinion. We will see to what extent this ideal is the status quo, the near future, or a utopian dream.

## **Phonetic vowel training for Dutch children learning English: the effect of input variability**

*Gwen Brekelmans<sup>1</sup>, Bronwen Evans<sup>2</sup>, & Elizabeth Wonnacott<sup>1</sup>*

*Department of Language & Cognition<sup>1</sup> and Department of Speech, Hearing & Phonetic Sciences<sup>2</sup> University College London*

High variability phonetic training (HVPT) with multiple speaker input (compared to low variability (LV) input with one speaker) has been used successfully to teach adults L2 speech contrasts. However, whether HV is beneficial over LV for children is not as clear, as variability is known to increase processing costs. The little research with children directly comparing HV and LV training input shows no clear evidence for a variability benefit.

To investigate whether children show the expected HV benefit, we ran a two-week phonetic training study in which two groups of Dutch learners of English, aged 7/8 and 11/12, were trained on Standard Southern British English phoneme contrasts that are notoriously difficult for Dutch learners: /u:/-/ʊ/, /e/-/æ/, /ʌ/-/ɒ/, with /i:/-/ɔ:/ used as a control contrast. Children received either HV or LV input in training: HV training was spoken by 4 talkers, while LV training was spoken by just one. Effects of variability were investigated using a pre/post-test design in which children's phoneme identification and discrimination abilities as well as their generalisation abilities to novel talkers and items were tested.

Results show only older children improved at post-test, and they did not show any evidence of generalisation to novel untrained items only shown at test. No evidence of a HV benefit was found, and in some tasks an LV benefit was even seen. These results suggest there may be a trade-off between task complexity and a potential variability benefit.

## **Effects of speaking style and context On young listener's word recognition**

*Suzanne van der Feest*

*The Graduate Center | City University of New York*

Previous research has found that listener-oriented speaking adaptations such as Clear Speech (directed at e.g. listeners with hearing issues, non-native speakers, or in noisy environments) improves intelligibility for adults (Smiljanic & Bradlow, 2009); and that Infant Directed Speech (IDS) aids perception and development for children (Cooper & Aslin, 1994). While both speaking styles share features such as slower speaking rate and enhanced pitch accents, it is not known whether listener-oriented speaking styles generally enhance intelligibility, or if only IDS (arguably due to enhanced positive affect) is beneficial to young children. This study investigates how clarity of the speech signal interacts with availability of contextual cues for younger listeners.

In two word-recognition experiments, participants heard sentences in Conversational, IDS, and Clear speech, while viewing a target picture matching the last word of the auditory stimulus paired with a distractor. In Experiment 1, 4-year-olds heard sentences with high-versus low-predictability semantic context (*He pointed at the cheese* vs. *Mice like to eat cheese*). In Experiment 2, 3-year-olds heard only semantically-neutral phrases (*Look at the cheese*). Four-year-olds benefited from contextual cues within each speaking style; and from both listener-oriented styles even in the absence of contextual cues. Three-year-olds showed

only benefits from IDS but not Clear speech; they did not yet benefit from adult-directed listener-oriented acoustic enhancements. The findings (LMERs) suggest that compared to adults in previous studies, children rely on bottom-up processing more heavily for word recognition, especially in low-context sentences.

## **Spraaksynthese met kinderstemmen**

*Arthur Dirksen  
Fluency, Amsterdam*

Kinderen die zelf niet spreken gebruiken daarvoor een communicatiehulpmiddel met spraaksynthese. Maar vaak moeten ze zich behelpen met een computerstem die is ingesproken door een volwassen spreker. In samenwerking met rdgKompagne is Fluency daarom begonnen met de productie van een reeks kinderstemmen, ingesproken door jongens en meisjes van 8-12 jaar uit verschillende regio's.

Een probleem dat eerst opgelost moest worden is dat het tekstcorpus dat we laten inspreken voor een volwassen stem voor deze nog jonge sprekers veel te ingewikkeld is, zowel wat betreft de woordenschat als wat betreft de zinscomplexiteit. Daarom hebben we een nieuw corpus samengesteld, dat bestaat uit 300 vrij eenvoudige zinnen van gemiddeld 8,3 woorden. De woordenschat is zoveel mogelijk afgestemd op gebruik in een communicatiehulpmiddel.

Het inspreken van de 300 zinnetjes kost ongeveer 3 uur en levert een kwartier spraak op. Dit is erg weinig voor de unit-selectie synthese waar we mee werken: nieuwe zinnen worden gemaakt door geschikte fragmenten uit de opgenomen spraak aan elkaar te knopen, en dit gaat beter naarmate er meer spraak is om uit te kiezen. Niettemin is het toch steeds gelukt om een bruikbare computerstem te maken. We zullen dit illustreren met voorbeelden van de zes kinderstemmen die we tot dusverre hebben opgenomen.

## **Repairing segmental speech errors: The role of competing lexical items**

*Sieb Nooteboom & Hugo Quené  
Universiteit Utrecht*

We propose that in repairing segmental speech errors “repairs” stem from word forms that during speech preparation and self-monitoring compete with the word form selected for being spoken. Activation of these potential repairs decreases during the time lag (500 ms) between detection in internal and in overt speech. Recently, it was demonstrated that repaired speech errors can be classified as detected in internal or in overt speech. A re-analysis of data obtained in two experiments eliciting speech errors and their repairs, shows that: (1) Error-to-interruption times are shorter after single elicited errors than after non-elicited and multiple (together “other”) errors. (2) Single elicited errors are relatively more often detected in internal speech than “other” errors. (3) The correct word form is the most frequent form used as repair, but less frequently after detection in overt speech than after detection in internal speech. (4) Interruption-to-repair times are shorter for single elicited than for other errors, but less so after detection in overt speech. These findings support the new theory of repairing.

## Testing hypotheses about the underlying deficit of Apraxia of Speech (AOS) through computational neural modelling with the DIVA model

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**Background:** Apraxia of speech (AOS) is a neurogenic motor speech disorder resulting from brain lesions to the left cerebral hemisphere whose precise nature in terms of functional impairment is still poorly understood. A recent study featuring a noise masking paradigm [Maas, Mailend & Guenther 2015, *JSLHR* 58: 185-200] found that vowel spacing (acoustic contrast) was more reduced under masking noise conditions in speakers with AOS than in control speakers. Additionally, vowel dispersion (token-to-token variability) was larger in the AOS group compared to the controls in the no-masking condition, while similar in the masking noise condition.

**Purpose:** The pattern of these behavioural results suggests that AOS reflects a disruption of feedforward control, whereas feedback control is spared and plays a more prominent role in achieving and maintaining segmental contrasts. The present study set out to validate this interpretation of AOS as a feedforward impairment using computational neural modelling with the DIVA model.

**Method:** In a series of computational simulations with the DIVA model featuring a noise-masking paradigm mimicking the behavioural experiment, we investigated the effect of a feedforward, feedback, feedforward+feedback, and a dysarthria impairment on average vowel spacing and dispersion in the production of six /bVt/ speech targets.

**Results:** The simulation results indicate that the output of the model with the simulated feedforward deficit resembled the group findings for the human speakers with AOS best.

**Conclusions:** These results provide support to the interpretation of the human observations, corroborating the notion that AOS can be conceptualized as a deficit in feedforward control.

## Studying asymmetries in tongue-palate contact in speech

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In speech-production studies, it is often implicitly assumed that articulation is symmetrical in the transverse plane of the vocal tract, i.e., that the amount of tongue contact with the palate is equal on the left- and right-hand sides. However, published palatograms visualising tongue-palate contact patterns generally show left-right asymmetry, although this finding is rarely mentioned. Characterisation of articulation asymmetry in native speakers would improve understanding of the process of speech production and its relationship with both neural organisation and the anatomy of the organs of speech.

The overall goal of this research is to conduct an empirical electropalatography study with 20 subjects in which the direction and amount of asymmetry in tongue-palate contact are studied as a function of (a) the type of speech sound, (b) anatomical asymmetries in speakers' palates, and (c) speaker handedness. The current study describes preliminary work in which an automated method for calculating a variety of asymmetry metrics from a time-series of palatograms was developed. The algorithm was applied to publicly available palatograms (Mocha-Timit) from two speakers performing a sentence production task. Asymmetry metrics were examined as a function of the place and manner of articulation. Most speech sound realisations were found to be asymmetrical with some clear differences between the speakers.

### **Spraak kwaliteit van kinderen met een gehoorverlies in de oren van niet-moedertaalsprekers**

*Nathalie Boonen, Hanne Kloots & Steven Gillis*  
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In het bestaande perceptieonderzoek naar spraakontwikkeling hebben de luisteraars die de kwaliteit van de spraak beoordelen doorgaans dezelfde moedertaal als de onderzochte kinderen. Ons experiment verkent een alternatief. In een paarsgewijze vergelijkingstaak werd de spraak kwaliteit van Vlaamse normaalhorende kinderen en kinderen met een gehoorverlies beoordeeld door moedertaalsprekers en niet-moedertaalsprekers. Toegevoegde waarde: luisteraars zonder enige kennis van de bestudeerde taal(structuur) baseren hun beoordelingen noodzakelijkerwijs op spraakgerelateerde elementen en worden niet afgeleid door bv. een normatieve visie op de standaarduitspraak of via uitspraakonderwijs verworven ideeën m.b.t. een regionale of dialectische klankkleur.

Van zeven normaalhorende kinderen en veertien kinderen met een gehoorverlies werden 126 korte Nederlandse nonsenszinnen verzameld. Deze zinnen werden in paren voorgelegd aan 81 moedertaalsprekers van het Frans, Duits, Italiaans en het Nederlands met behulp van een tool voor paarsgewijze vergelijking (D-PAC) die vertrekt vanuit een holistische visie op beoordeling. Per paar werd aan de luisteraars gevraagd welke stimulus het beste klonk. Het eindresultaat: een rangorde van de stimuli volgens spraak kwaliteit.

Als we de rangorde analyseren, zien we aan de ene kant vooral normaalhorende kinderen terwijl kinderen met een gehoorverlies zich geclusterd aan het andere uiteinde bevinden. Deze verdeling van de stimuli was zeer gelijklopend voor alle luisteraarsgroepen. Ze hoorden dus allemaal een kwalitatief verschil tussen de spraak van normaalhorende kinderen en kinderen met een gehoorverlies. Spraak van normaalhorende kinderen werd unaniem als beter ervaren dan die van kinderen met een gehoorverlies. De talige achtergrond van de luisteraar blijkt dus nauwelijks of geen invloed te hebben op de beoordelingen.

## **Vowel space as a tool to evaluate articulation problems**

*Rob van Son*

*Nederlands Kanker Instituut - Antoni van Leeuwenhoek (NKI-AVL)*

Treatment for oral tumors can lead to long term changes in the anatomy and physiology of the vocal tract and result in problems with articulation. There are currently no readily available automatic methods to evaluate changes in articulation. We developed a Praat script which plots and measures vowel space coverage. The script reproduces speaker specific vowel space use and speaking-style dependent vowel reduction in normal speech from the Dutch IFA corpus (5h speech, 5M&5F speakers). In recordings of 30 patients treated for oral tumors, deviant (distorted) articulation before and after treatment is evaluated in a listening experiment and from a maximal articulation speed task. Average Articulation Rate reduces after treatment. Vowel space use in these patients was visibly affected by treatment. Vowel space use before and after treatment is still significantly correlated. There is a shift observed from the /u/→/a/-corner in the vowel triangle. Deviant articulation correlates with Vowel-Space-Area and the shape of the /u/ and /i/ corners of the vowel triangle. In conclusion, measurements of vowel space use from running speech can be useful in evaluating articulation disorders.

### **Exploring alignment in articulation rate**

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Alignment is the phenomenon that interlocutors adapt their way of speaking to each other. It is still an open question why people align. We also do not know how long alignment lasts and whether speakers align faster to someone they have spoken to before. We conducted an experiment to obtain more insight in these questions by investigating articulation rate, which has previously been shown to show alignment, e.g. [1, 2].

The experiment consisted of a sentence completion task. Twenty-six native Dutch speakers interacted with a computer with the pre-recorded speech of two confederates. Participants started the experiment by completing a pre-test by themselves, after which they did three rounds: Round 1 (with Confederate 1), Round 2 (with Confederate 2) and Round 3 (with Confederate 1). This was then followed by a post-test in which they completed sentences by themselves again.

Articulation rates were measured over each round. Preliminary results indicate that participants spoke faster when speaking to a confederate than when they were speaking by themselves. This may be alignment because both confederates spoke more quickly than the participants in the pre-test. Interestingly, the higher Confederate 2's articulation rate, the slower participants spoke. This could be due to social factors. Lastly, the data suggest that articulation rate alignment lasts in the post-test: participants do not immediately return to their habitual articulation rate. This suggests alignment does not only consist of immediate priming of the preceding utterance.

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## Using random effects to investigate phonetic variation: a puzzling discrepancy between production and perception

Cesko Voeten

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This study reports on perception (rhyme decision with morphed stimuli; see (1)) and production (word-list reading; see (2)) differences in the vowel systems of three groups of subjects: 45 Netherlandic-Dutch subjects, 45 Flemish-Dutch subjects, and an unclear group of 18 Dutch-speaking Belgians who have been in the Netherlands for a long time (years<--->decades). I term this group ‘unclear’ because it is conceivable that some of these subjects, but not others, may have adapted their Flemish phonetics to the Netherlandic norms, which can be considered a long-term form of phonetic accommodation (*sensu* Pardo et al 2012). This is the present study’s object of investigation, with a focus on the Dutch tense mid vowels (contextually-restricted diphthongs in Netherlandic Dutch, monophthongs in Flemish Dutch; Adank et al 2007).

What factors discriminate ‘successful’ adapters from ‘unsuccessful’ adapters? Because the critical third group of subjects is not (a priori) homogeneous, the present study partitions the 108 subjects into groups that are defined *empirically*. For the production part, this is done by finding clusters in the predicted random slopes of a naïve mixed-effects model, which turns out to work very well. Puzzlingly, the same approach performs poorly for the perception data, though a group-level effect does arise when explicitly entered into the model. The precise reason for this discrepancy is not known, but it suggests that for perception but not production, even the reference groups are not homogeneous.

- (1) Example stimuli for the rhyme decision task, which was designed to be a covert phoneme-decision task. The percentages refer to the degree to which the vowel [e:] was morphed to [ɛi]. All words were pseudowords to enable precise experimental control of the vowels without running into the Ganong effect (Ganong 1980).

Auditory word	Participant				Visual target
	1	2	3	4	
[de:tə]	20%	40%	60%	80%	→ does this rhyme with <grijte>?
[ble:tə]	40%	60%	80%	20%	→ does this rhyme with <zete>?

- (2) Example stimuli for the word production task:

*nobelere*  
*pijn*  
*verschuil*  
*beul*



## **How Dutch high-school pupils cope with German reduced speech**

*Karin Wanrooij  
Leiden University*

Natural speech features ‘reductions’, i.e., deletions and assimilations of speech sounds within and across words. For instance, German native speakers may say “*denhama*” for “*den haben wir*” (‘We have that one’). Such reduction patterns are often language-specific and are therefore likely to be problematic for non-native listeners (e.g., for Dutch listeners, who may perceive “*den Hammer*” [‘the hammer’]). We examined how, after almost four years of training in German as a second language, Dutch high-school pupils perceive and understand German reduced speech.

For this, 39 Dutch (and 38 German) adolescents listened to either reduced or unreduced short phrases in a dictation task (48 trials). Accuracies were dramatically lower for pupils presented with reduced phrases than for those presented with unreduced phrases, thus demonstrating that Dutch pupils struggle with non-native German reduced speech even after almost four years of high-school training.

An exploration of error types showed that pupils listening to reduced speech deleted and substituted targets more frequently, and more often segmented the phrases incorrectly. The errors also suggested that most pupils apply multiple ‘listening strategies’. For instance, many of them substituted targets by non-words (indicative of a ‘bottom-up’ strategy) *and* by other words not intended by the speaker (indicative of a ‘top-down’ strategy). Overall, non-word substitutions outnumbered word substitutions. Outcomes will be discussed in the context of practices in Dutch classrooms, as observed in questionnaires among teachers.

## **Pitch in native and non-native Lombard speech**

*Katherine Marcoux & Mirjam Ernestus  
Centre for Language Studies, Radboud University, Nijmegen, The Netherlands*

Lombard speech, speech produced in noise, is acoustically different from speech produced in quiet (e.g. higher Fundamental Frequency (F0), increase in amplitude, and decrease in spectral tilt) and has extensively been studied in natives (e.g. Summers et al. 1988). To investigate whether non-native Lombard speech is different from native Lombard speech we recorded 30 Dutch natives reading 144 sentences in Dutch and English and 9 American-English natives in English, in quiet and noise (hearing 83 dB SPL Speech-Shaped Noise). We additionally manipulated the location of focus in the sentence, having early and late focus sentences. Our analysis using linear mixed effect models indicates that the Dutch show an increase in F0 in both Dutch and English Lombard speech as compared to their speech produced in quiet. These results show that non-natives also produce Lombard speech. The American-English data are more complex, only showing a difference in F0 between speech produced in quiet and Lombard speech in sentences with late-focus, due to post-focal compression. These results suggest that pitch-changes in Lombard speech are more language specific than originally thought. Moreover, they suggest that acquiring a new language involves learning how pitch changes in that language’s Lombard speech.

## **Mandarin tone identification by musicians and non-musicians: effects of modality and speaking style**

*Yueqiao Han, Martijn Goudbeek, Maria Mos & Marc Swerts  
Tilburg Center for Cognition and Communication, Tilburg University*

A considerable number of studies have shown that musical ability has a positive effect on second language learning. Extending the existing body of work, this study investigates the combined effects of musical ability, modality and speaking style on Mandarin tone identification in tone-naïve listeners. To examine the effects of visual information and hyperarticulated speech, Mandarin tones elicited in two speaking styles (natural and teaching style) were presented in audio-only or audiovisual modality to listeners with or without musical experience. The Goldsmith Musicality Index was used to measure the musical aptitude of the participants. Musicians generally outperformed non-musicians in a tone identification task, and modality and speaking style both affected the tone identification: participants performed better in the audiovisual and teaching style conditions. In addition, the tones differed in recognition: the identification of tone 3 (a low-falling-rising) proved the easiest and all participants had more difficulty identifying tone 4 (a high-falling). Musical training was the most important predictor for Mandarin tone perception. These findings suggest that learning to perceive Mandarin tones benefits from musical expertise, visual information and hyperarticulated speaking style.

Key words: Mandarin tone identification; audiovisual modality; speaking style; musicians and non-musicians.

## **De realisatie van gevulde pauzes in L1-Nederlands en L2-Engels**

*Meike de Boer & Willemijn Heeren  
Leiden University Centre for Linguistics, Universiteit Leiden*

Binnen talen bevatten de pauzemarkeerders ‘uh’ en ‘um’ waardevolle informatie voor forensische sprekervergelijkingen (e.g. Braun & Rosin, 2015; Hughes et al., 2016). Volgens Clark en Fox Tree (2002) nemen sprekers hun pauzemarkeerders vaak mee van de eerste (L1) naar de tweede taal (L2). Dit voorspelt dat pauzemarkeerders in L1 en L2 forensisch met elkaar vergeleken kunnen worden. Moedertaalsprekers van verschillende talen gebruiken pauzemarkeerders echter verschillend (De Leeuw, 2007; Wieling et al., 2016), wat suggereert dat geoefende L2-sprekers hun gebruik aanpassen.

We onderzochten pauzemarkeerders in spontane spraak van twintig Nederlandse studentes in zowel L1-Nederlands als L2-Engels (minimaal B1-niveau ERK/CEFR; Quené et al., 2017). De vraag was hoe deze sprekers ‘uh’ en ‘um’ produceren in beide talen, en hoe vergelijkbaar de realisaties zijn betreffende zowel de proportie uh:um als de fonetische vorm.

Overeenkomstig Nederlandse versus Engelse moedertaalsprekers (De Leeuw, 2007; Wieling et al., 2016) gebruikten de onderzochte sprekers in het Nederlands twee keer zo vaak ‘uh’ als ‘um’, terwijl ze in het Engels beide vormen ongeveer even vaak gebruikten. Daarnaast lieten formantmetingen zien dat de centrale klinker in L2-Engels meer open en naar achteren gerealiseerd werd dan in L1-Nederlands. In de presentatie bespreken we tenslotte mogelijke gevolgen voor forensische sprekervergelijkingen.

## Referenties

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## Agenda Algemene Ledenvergadering der Nederlandse Vereniging voor Fonetische Wetenschappen

1. Opening
2. Mededelingen
3. Financiën: De balans over 2017 zal voor inzage beschikbaar zijn.
4. Bestuurssamenstelling
  - Mirjam de Jonge is voornemens het penningmeesterschap over te dragen.
  - Anne-France Pinget en Martijn Goudbeek stellen zich verkiesbaar als bestuurslid; Anne-France is bereid het penningmeesterschap op zich te nemen.
  - Andere leden die zich voor het bestuur verkiesbaar willen stellen wordt verzocht dit voor aanvang van de vergadering kenbaar te maken bij de secretaris van de vereniging ([NVFW@rug.nl](mailto:NVFW@rug.nl)).
5. W.v.t.t.k.
6. Sluiting

## Programma Dag van de Fonetiek 2018

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<b>Sessie 2</b>	11:50	Sieb Nooteboom & Hugo Quené	<i>Repairing segmental speech errors: The role of competing lexical items</i>	4
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	12:20	N.R. Miller, C. Reyes-Aldasoro, L. Daems, & J. Verhoeven	<i>Studying asymmetries in tongue-palate contact in speech</i>	5
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<b>Sessie 4</b>	15:40	Karin Wanrooij	<i>How Dutch high-school pupils cope with German reduced speech</i>	9
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	16:10	Yueqiao Han, Martijn Goudbeek, Maria Mos & Marc Swerts	<i>Mandarin tone identification by musicians and non-musicians: effects of modality and speaking style</i>	10
	16:25	Meike de Boer & Willemijn Heeren	<i>De realisatie van gevulde pauzes in L1-Nederlands en L2-Engels</i>	10
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