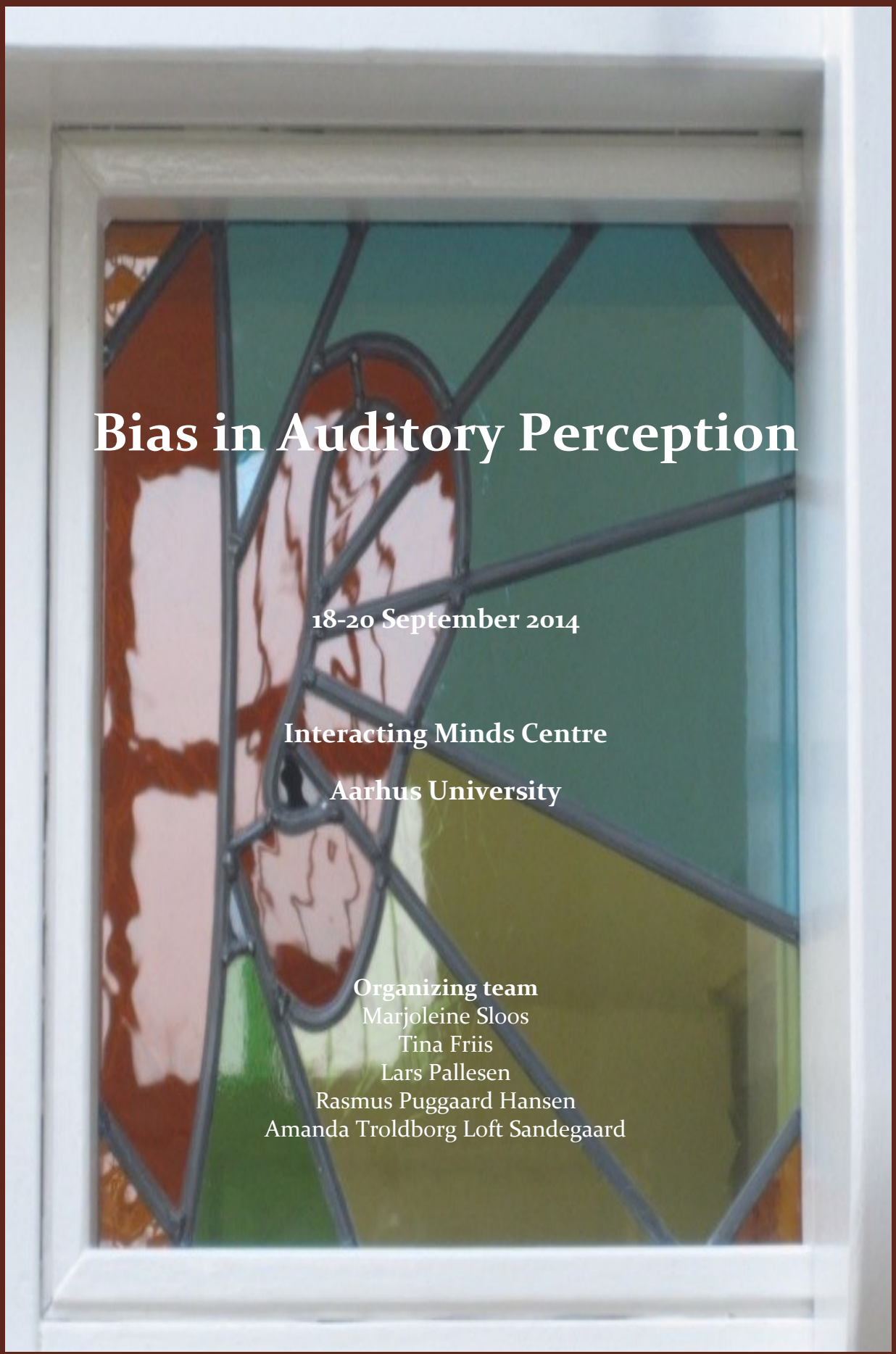


Bias in Auditory Perception

18-20 September 2014

Interacting Minds Centre

Aarhus University

Organizing team

Marjoleine Sloos
Tina Friis
Lars Pallesen
Rasmus Puggaard Hansen
Amanda Troldborg Loft Sandegaard

Welcome

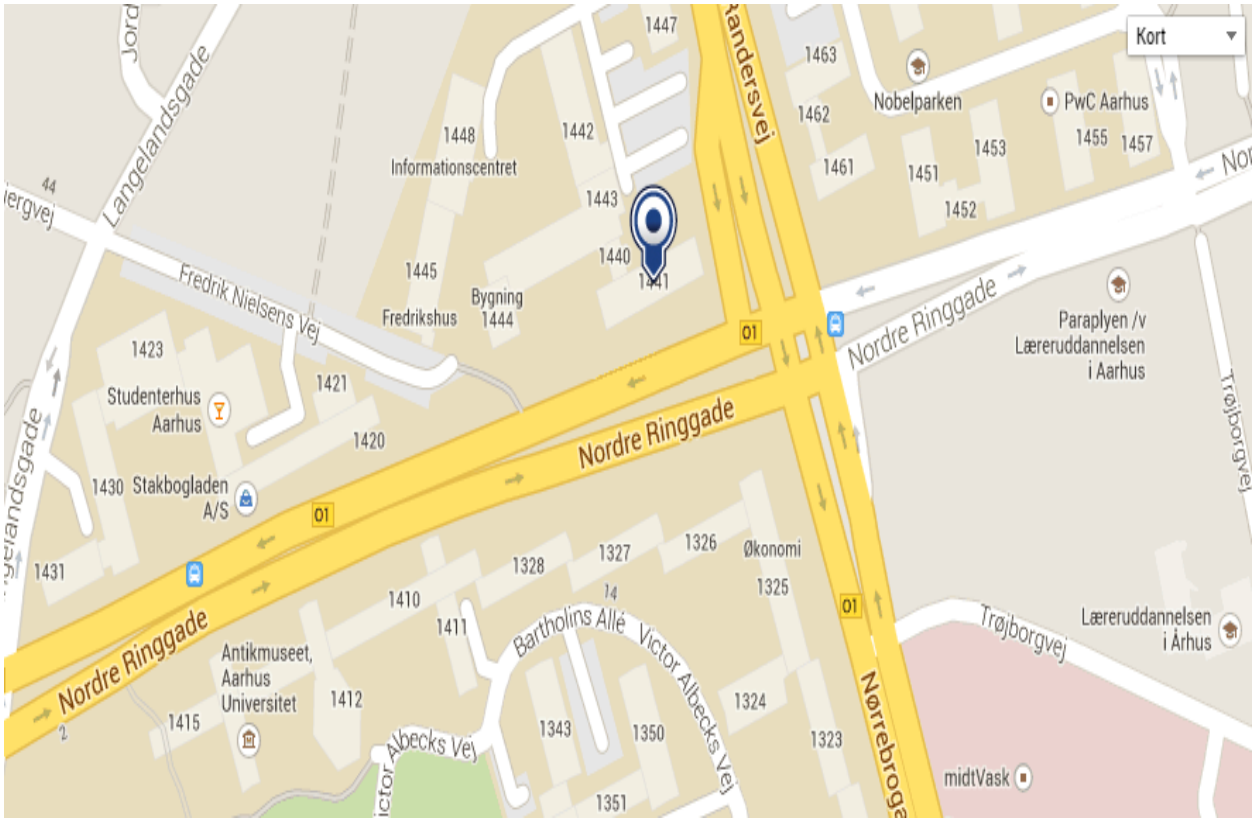
Welcome to the conference “Bias in Auditory Perception” at the Interacting Minds Centre! This is a multidisciplinary conference which aims to bring together researchers from different fields of research who share a common interest in biased auditory perception. The program consists of renowned keynote speakers who approach biased perception from different perspectives, a round-the- table discussion, and nineteen selected talks. We think this meeting offers an excellent opportunity for sharing ideas, networking, and initiating new collaborations. In line with this, we would encourage you to connect with your colleagues and students from all over the world. Therefore we scheduled a fair amount of breaks, a conference dinner, and a visit to the Aros Museum. We are also proud to announce that we received the interest of the board of the journal *Perception* which provides us the opportunity to guest edit a special issue.

This conference is funded by the Danish Council for Independent Research "Mobilex Mobility Grant", co-financed by the EU Program "Marie-Curie" under FP7.

Marjoleine Sloos,
Principal organizer
Interacting Minds Centre, Aarhus University

Venues

The **conference** is held at
The Interacting Minds Centre
Aarhus University
Building 1.441, room 012
8000 Aarhus



AROS museum (http://www.aros.dk)
Aros Allé 2
Aarhus

Program "Bias in Auditory Perception"

Thursday 18 September

8:30	**Registration**
9:00-9:10	**Opening** *Marjoleine Sloos*

Session Sociolinguistics 1

Chair: Nicolai Pharao

9:10-9:40	**Talk 1** "How the demographic make-up of our community influences our speech perception" *Shiri Lev-Ari & Sharon Peperkamp*
9:40-10:10	**Talk 2** "Regional differences in the perception of a sound change in progress" *Anne-France Pinget*
10:10-10:40	**Talk 3** "The role of dialect exposure in the perception of sociophonetic variables" *Nancy Niedzielski*
10:40-11:00	**Coffee break**

Session Sociolinguistics 2

Chair: Nicolai Pharao

11.00-11.30 **Talk 4** "Suburban Swedish maturing: Variation and perceptions among adult speakers of Swedish contemporary vernacular"
Nathan Young

11:30-12:00 **Talk 5** "Non-native prosody and its misperception: Implications of bias"
Richard Todd

12:00-12:30 **Talk 6** "Own variety bias"
Marjoleine Sloos & Andrea Ariza Garcia

12:30-14:00 **Lunch**

Session Phonetics

Chair: Cynthia Blanco

14:00-14:30 **Talk 7** "Directional asymmetry in the brain's perception of speech sounds: an MMR study of [t] vs. [d]"
Andreas Højlund Nielsen, Line Gebauer, William B. McGregor, Mikkel Wallentin

14:30-15:00 **Talk 8** "Speaker intelligibility may influence perception acuity"
Will Schuerman, Antje Meyer, James McQueen

15:00-15:30 **Talk 9** "Effects of pitch on perceived duration: Comparing speech and non-speech stimuli"
Carlos Gussenhoven & Wencui Zhou

15:30-16:00 **Tea break**

16:00-16:30 **Talk 10** "Learning biases for speech: domain-general or domain-specific?"
Sabine van der Ham & Bart de Boer

16:30-17:15 **Key note speech** "Salience, Attention, and the Perception of Sociophonetic Variables"
Katie Drager

17:15 **Closing first day**

Friday 19 September

Session Second language acquisition 1

Chair: Wencui Zhou

8:30-9:00 **Talk 11** "Perceptual asymmetries in native and nonnative consonant discrimination: a Natural Referent Consonant Hypothesis"
Rikke Bundgaard-Nielsen & Brett Baker

Chair: Rikke Bundgaard-Nielsen

9:00-9:40 **Key note speech** "Universal biases in native and non-native speech perception"
Ocke-Schwen Bohn

9:40-10:10 **Talk 12** "Foreign accent effects in emotional word processing"
Anna Hatzidaki, Christina Baus, Albert Costa

10:10-10:40 **Talk 13** "The mis-production of TSM final stops"
Man-ni Chu

10:40-11:00 **Coffee break**

Session Second language acquisition 2

Chair: Wencui Zhou

11:00-11:30 **Talk 14** "Effect of phonotactic constraints on L2 speech processing"
Tamami Katayama

11:30-12:00 **Talk 15** "Adaptation to foreign accents: The role of listener language experience and task expectations"
Cynthia Blanco, Hoyoung Hi, Rajka Smiljanic

12:00-12:30 **Talk 16** "Bias or not: Cross-linguistic perception in accented-speech"
Hongyan Wang

12:30-14:00 **Lunch**

Session CI & Neurolinguistics

Chair: Alexandra Kratschmer

14:00-14:30 **Talk 17** "Perception of acoustic emotion cues in normal-hearing listeners and cochlear-implant users"
Steven Gilbers, Christina Fuller, Dicky Gilbers, Mirjam Broersma, Martijn Goudbeek, Rolien Free, Deniz Başkent

14:30-15:00 **Talk 18** "Divergence in the perception of lexical stress by cochlear implant and normal hearing listeners"
David Morris

15:00-15:30 **Talk 19** "Sounds in context: electrophysiological evidence for local bias in auditory processing
Ethan Weed

15:30-16:00 **Tea break**

16:00-16:30 **Talk 20** "Reduced influence of prior perceptual knowledge in autism – evidence from auditory localisation"
Joshua Skewes & Line Gebauer

16:30-17:15 **Key note speech** "Top-down processing optimally tunes perception and learning of degraded speech"
Ediz Sohoglu

17:15 **Closing second day**

19:00 **Conference dinner**

Saturday 20 September

Chair: Line Gebauer

9:00-9:40 **Key note speech** "In the mind of the listener: enculturing through patterned practice"
Andreas Roepstorff

Session Cross-modal & Music

9:40-10:10 **Talk 21** "Interpreting infant vocal distress: the ameliorative effect of musical training in depression"
Christine Parsons, Katherine Young, Alan Stein, Morten Kringelbach

10:10-10:40 **Talk 22** "Potentials for bias in a listener's temporal perception of music"
Justin Christensen

10:40-11:00 **Coffee break**

11:00-11:30 **Talk 23** "Discussion on pitch accent: a case study"
Xuefeng Zhou

11:30-12:00 **Talk 24** "The effect of auditory sensitivity on audiovisual processing"
Cecilie Møller, Andreas Højlund Nielsen, Niels Christian Hansen, Joshua Skewes, Klaus Bærentsen, Peter Vuust

12:00-13:00 **Round the table discussion**

13:00-14:00 **Lunch**

14:00-14:10 **Closing Conference**
Marjoleine Sloos

15:00-17:00 **AROS museum visit**
Aros Allé 2, 8000 Aarhus (http://www.aros.dk/)

How the demographic make-up of our community influences our speech perception

Shiri Lev-Ari[1], Sharon Peperkamp[2]

[1]Max Planck Institute for Psycholinguistics, [2]Laboratoire de Sciences Cognitives et Psycholinguistique

shiri.lev-ari@mpi.nl, sharon.peperkamp@ens.fr

Speech perception is known to be influenced by listeners' expectations of the *speaker*. Here we test whether listeners' expectations of the *language* can also influence perception, as well as test one potential source that can give rise to such expectations - the demographic make-up of one's community. We ran online experiments with participants from all across the US and matched their performance with census data on the proportion of Spanish and other foreign language speakers in their communities. We show that the demographic make-up of individuals' communities influences their expectations of a foreign language to have a trill versus a flap (Exp. 1), as well as their consequent perception of these sounds in a perceptual matching task (Exp. 2). Thus, we show that while individuals occasionally misperceive a flap in a foreign language as a trill, because of their expectations of the foreign language to have a trill, a higher proportion of *non-trill* language speakers in one's community decreases the likelihood of this misperception. These results show that individuals' environment can influence their perception by shaping their linguistic expectations. These results also have implications for second language acquisition.

Regional differences in the perception of a sound change in progress

Anne-France Pinget

Utrecht University
a.c.h.Pinget@uu.nl

This paper presents the results of a speeded categorization task aimed at getting insight in the speech perception patterns of speakers from five regions of the Dutch language area. In these region the devoicing of onset /v/ to [f] is in different stages (WestFlanders & Flemish-Brabant: incipient, Limburg: strong, South-Holland: very advanced and Groningen: almost complete) and the regions show differences in the implementation of the voicing contrast (Kissine et al. 2004). We tested the use of two dimensions (degree of periodicity and duration, 9 steps each) in the perception of the Dutch labiodental fricatives. In each region we selected 10 male and 10 female participants, age 18-28, and highly educated. The participants had to categorize 405 stimuli (9 x 9 x 5 runs) as *v* or *f*.
It turned out that in all regions, periodicity is consistently used as the main cue in the categorization of the stimuli. Duration only plays a minor role. Listeners from Groningen are the least categorical in their judgments and listeners from West-Flanders the most categorical. These results will be discussed in relation to the production differences found in previous studies.

References

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The role of dialect exposure in the perception of sociophonetic variables

Nancy Niedzielski

Rice University
niedz@rice.edu

We investigated Houston listeners' awareness of the local glottalization pattern affecting word-final /t/ and /d/. While glottalized final /t/ is common in both African-American and European-American English, the rate of/d/-glottalization is considerably higher for African American English speakers. An experiment was designed to determine whether this asymmetry is reflected in the way Houston listeners perceive speakers of the two groups, and the degree to which listeners' own experience influences that perception.

We used speech synthesis create a set of realistic-sounding words with final glottalization, and each word could thus be interpreted as containing either underlying /t/ or /d/. We then created a 5-step vowel duration continuum extending into the range associated with a prevoiced context (up to ~300ms). Using photographs, participants heard these stimuli in the guise of either an African-American or a White speaker. We found that listeners indeed gave more /d/-responses in the African-American speaker condition than in the White speaker condition, and in fact, this effect was strongly correlated with the listeners' social and racial categories. We thus demonstrate that a listeners' perception of phonetic features is heavily influenced by their own experience with local sociophonetic variation.

Suburban Swedish maturing: Variation and perceptions among adult speakers of Swedish contemporary vernacular

Nathan Young

Stockholm University
n8.young@gmail.com

Up to now, adolescent speakers have been the primary focus when researching contemporary variation in the language of Sweden's urban areas. This study contributes to the growing body of research on the topic by examining and reporting on *adult* speakers of what is referred to as *förortssvenska* (English: *Suburban Swedish*). This study focuses specifically on formal speech registers of eight young working-class men from Stockholm along with the perception and reception of their speech by two independent native-listener groups.

The paper is the first to present quantifiable data on what has been previously referred to as a "staccato" rhythm in Suburban Swedish. Strong correlations are shown between prosodic rhythm as measured by *the normalized pairwise variability index* (nPVI) and speech speed to mean listener attitudes (R^2=0.9). A strong correlation is also shown for nPVI's influence on mean listener-projected ethnicity (R^2=0.8). Alongside variation in rhythm, we also see phonemic variation that trends toward specific indexes of social identity as revealed by speaker interviews and native-listener assessments. Alongside linguistic variation among speakers, there is also significant variation *within* speaker peer groups.

Alongside identifying linguistic features, the study examines sociocultural mechanisms behind the production of these features as revealed by interviews with and qualitative observations of the speaker and listener participants.

Non-native prosody and its misperception: Implications of bias

Richard Todd

Speech and Hearing Research Group, University of Sheffield
R.Todd@dcs.shef.ac.uk

Recent phonetic investigations reveal how the speech of ethnic diaspora and the wider community may be distinguished, on auditory- and acoustic-phonetic grounds, from minimal cues (Todd, 2014). While the former work illustrates the robustness of human perception in adverse conditions, it also suggests perfect second/subsequent language acquisition could be an ongoing (if not unachievable) task, in phonetic terms (Riney & Flege, 1998; Ingels, 2010). None of such studies however, consider a very important issue which highly-proficient speakers from non-native/diasporic backgrounds often bear alone. Thus, listener misperception is raised.

This study uses a forensic backdrop to illustrate the extent to which interlocutor differences can cause a listener to make inferences quite removed from any the respective speaker intended. The work shows that unfavourable outcomes are not only evident if such speakers fail to use the right words; lacking the right way to say those same words can prove equally undermining, at times.

The study also uses large-scale survey data to explore the (in)frequency of social interaction between ethnic out-groups (e.g., non-native speakers) which arguably impacts on the hardening of various language attitudes (cf. McKiman and Hamayan, 1984). In all, the work provides valuable insights to how biases can promote ethnic separations, which in turn exacerbates concerns surrounding speaker credibility or honesty.

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Own variety bias

Marjoleine Sloos, Andrea Ariza Garcia
marj.sloos@gmail.com, andreariza.g@gmail.com

Interacting Minds Centre, Aarhus University

Linguistically naïve speakers have the ability to identify their own and other dialects. Few consensuses exists on the accuracy of dialect identification, however. In our paper, we show a particular misidentification of French nationalects. Speakers of four varieties of French (viz. from Belgium, Canada, France, and Switzerland) listened to speech excerpts from only Canadian and French speakers. They were asked to identify the variety of the speakers (as an open question) among other things.

Canadian speech turned out to be easier to identify than French from France for all respondents. The French listeners had the fewest number of misidentifications, followed by (in that order) Belgian, Canadian, and Swiss listeners. These misidentifications could be divided into three subcategories:

1. misperception of the own variety
2. identification of another variety as the own variety
3. identification of another variety as a third variety

Remarkably, we found that Belgian and Swiss speakers in no less than 10%, respectively 16% of the cases identified French from France or Canada as their own variety—even on the level of the local dialect. We will discuss this bias towards the own variety in the light of the literature.

Directional asymmetry in the brain's perception of speech sounds: an MMR study of [t] vs. [d]

Andreas Højlund Nielsen[1,2], Line Gebauer[1], William B. McGregor[3], Mikkel Wallentin[2]

[1]Interacting Minds Centre, Aarhus University, [2] Centre of Functionally Integrative Neuroscience, Aarhus University, [3]Aarhus University

linahn@cas.au.dk, linegebauer@gmail.com, linwmg@dac.au.dk, mikkel@dac.au.dk

Is the neutrally perceived distance from [d] to [t] different from the one from [t] to [d]? To address this question we investigated the mismatch response (MMR) both directional contrasts. The MMR has been shown to be an index of the brain's auditory change detection. We therefore hypothesized that any potential directional difference in the contrasts would be detectable as a difference in MMRs. The stimuli consisted of the four Danish syllables: [tæ] and [dæ] (meaning 'take' and 'then', respectively), and [æt] and [æd] (both meaning 'that'). We used MEG (magnetoencephalography) to measure participants' (n = 17) mismatch fields (magnetic equivalent of the MMR). We found a main effect of contrast direction (*p*FWE=0.001 at the cluster---level), peaking around 124 ms after deviance onset. Contrast estimates revealed that this main effect was driven by stronger MMRs to both [tæ] and [æt] than to [dæ] and [æd]. Participants' brains thus seem to experience the perceptual distance from [d] to [t] as larger than that from [t] to [d], despite the acoustic difference being the same for both contrasts. We discuss this finding in relation to previous studies on asymmetries in speech perception, as well as behavioral results on detection of the contrasts.

Speaker intelligibility may influence perceptual acuity

Will Schuerman, Antje Meyer, James McQueen

Max Planck Institute for Psycholinguistics
Will.Schuerman@mpi.nl, Antje.Meyer@mpi.nl, j.mcqueen@pwo.ru.nl

Perceived intelligibility may affect listener judgments about non-linguistic speaker characteristics, such as intelligence and likeability (Rice et al 1993). However, speech perception and production are intricately linked (Casserly & Pisoni 2010); for example, acute perceivers have been found to have more precise articulations (Perkell et al 2004). We investigated whether the perceived intelligibility of a speaker influences how intelligible they perceive the speech of another speaker to be.

In Exp. 1, speakers (n=28, all female) produced 120 Dutch words, then attempted to recognize noise-vocoded versions of these recordings one week later (Shannon et al 1995). For each participant, 60 words were synthesized from their own recordings while 60 came from the recordings of the most statistically average speaker. In Exp. 2, 16 listeners (all female) performed a similar recognition task with stimuli sampled from all 28 speakers in Exp. 1. Average accuracy for speaker's sound files in Exp. 2 constituted that Speaker's Intelligibility rating.

In addition to correlating with accuracy for a speaker's own recordings, Intelligibility ratings significantly correlated with accuracy for the Average Speaker ($r = 0.32$, $t(26) = 1.7413$) in Exp. 1. These results suggest that clearer speakers tend to be better at recognizing the speech of others, supporting the claim that perceptual and articulatory acuity are inter-dependent (Perkell et al 2004).

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Effects of pitch on perceived duration: Comparing speech and non-speech stimuli

Carlos Gussenhoven[1], Wencui Zhou[2]

[1]Radboud University Nijmegen, [2]Max Planck Institute for Psycholinguistics
c.gussenhoven@let.ru.nl, Wencui.Zhou@mpi.nl

The effects of pitch on perceived duration has not led to a uniform explanation (for references see Yu, Lee & Lee 2014). One question concerns the extent to which effects are speech-specific, i.e. whether the explanation is rooted in speech production and perception. Another is that, under the assumption of a relation to speech, whether the effects are compensatory or congruent, i.e. whether they form the mirror image of production biases or rather directly reflect production biases. On the basis of an experiment with disyllabic speech stimuli with Dutch and Chinese listeners, Gussenhoven & Zhou (2013) suggest that effects of pitch height and shape on perceived vowel duration is exclusively based on the listener's compensation of articulatory biases. A prediction is that non-speech stimuli will not show the same effects. We report an experiment with speech and non-speech stimuli with identical durations and fo and show that the same biases occur in both types of stimuli. Also, rises are perceived as longer than falls, in accordance with results obtained by Yu, Lee & Lee (2014), a congruent not a compensatory effect. We discuss the significance of these results for the compensation hypothesis.

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Learning biases for speech: domain-general or domain specific?

Sabine van der Ham, Bart de Boer

Vrije Universiteit Brussel
sabine@ai.vub.ac.be, bart@arti.vub.ac.be

A major issue in language evolution research is whether humans have learning biases that are specific for language. Certain domain general cognitive mechanisms -such as statistical learning and generalization- are known to play a significant role in language learning, but this does not necessarily mean that the way in which these mechanisms are employed are exactly the same for language learning compared to other cognitive tasks (cf. Ferdinand et al., 2014; Lany & Saffran, 2013). We are exploring novel ways to investigate human learning biases specifically for speech; we will discuss an experiment in which we investigated how categories of speech emerge from a continuous signal. While most psycholinguistic experiments done in this area are typically passive (e.g. head turn experiments with infants), we investigate speech learning biases by recording our participants' direct imitations and reproductions of abstract speech sounds. Our findings indicate that participants have a domain-general bias, and participants' musical abilities seem to influence how well they are able to remember and reproduce the training sounds. Besides this, we encountered some problems; some minor, some major. We would like to share and discuss these, and we welcome constructive feedback.

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Salience, Attention, and the Perception of Sociophonetic Variables

Katie Drager

University of Hawai'i at Mānoa
E-mail

Social information attributed to a speaker influences speech perception: listeners perceive sounds differently depending on, for example, the speaker's apparent gender (Strand 1999), regional background (Niedzielski 1999), and age (Hay et al. 2006). These shifts in perception appear to occur automatically and without conscious effort (Hay & Drager 2010), but the effects tend to be stronger when listeners are aware of the sociolinguistic variation being observed (Hay & Drager 2010; Drager 2011). In this talk I explore the role of sociolinguistic awareness on listeners' perceptions of phonetic variables and discuss the ways in which patterns of perception can inform models of speech perception. I interpret results from sociophonetic perception experiments using an exemplar-based model of speech perception with social indexing. In the model, the salience of sociophonetic variables influences the weight of indices between stored social and phonetic information, and overt stereotypes of sociophonetic variables are stored as abstract representations.

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Universal biases in native and non-native speech perception

Ocke-Schwen Bohn

Aarhus University
engosb@hum.au.dk

It is well known that nonnative listeners are biased perceivers: Their perception of foreign language speech sounds is characterized by native language predispositions as described by Flege's (1995) Speech Learning Model and Best's (1995) Perceptual Assimilation Model. However, some biases, especially for vowels, cannot be attributed to a transfer of native language perceptual habits to a nonnative language. This presentation reviews a fairly large set of studies which indicate that both adult (nonnative) and infant (native) learners' vowel perception is guided by two universal biases: A bias favoring vowels which are relatively peripheral in the acoustic/articulatory vowel space, and a bias which results in a reliance on duration in the perception of difficult-to-perceive vowel contrasts. These biases are universal in the sense that they are perceptual defaults which are unrelated to any previous language experience. The perceptual preference for relatively peripheral vowels, as described in the Natural Reference Vowel framework of Polka and Bohn (2011), is observed in both infant and adult learners for vowel contrasts in the early stages of learning. Specific experience with a vowel contrast leads to a "loss" of this bias, which is otherwise maintained in the absence of specific experience. The heightened sensitivity to vowel duration differences is observed as long as sensitivity to spectral differences is underdeveloped. The presentation concludes with a discussion of the potential causes of these universal biases in vowel perception.

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Perceptual asymmetries in native and nonnative consonant discrimination: a Natural Referent Consonant Hypothesis

Rikke Bundgaard-Nielsen[1] & Brett Baker[2]

[1]La Trobe University, 2Melbourne University
rikkelou@gmail.com, bjbaker@unimelb.edu.au

Native speech perception is often thought to be highly accurate and to reflect successful language-specific tuning, while cross-language speech perception can be much more difficult, depending on the degree of overlap between the phonological categories of the native and the non-native languages in question. The present study of Wubuy and English listeners' perception of Wubuy coronal stop contrasts tests these assumptions in two ABX-discrimination tasks. The results show that some Wubuy coronal stop contrasts are more difficult than others to discriminate for both native and non-native speakers alike, but also reveal systematic differences in discrimination performance of the two groups. The findings are thus consistent with an analysis that universal patterns of speech perception, as well as language-specific tuning, are needed to account for the performance of the two listener groups.

Foreign accent effects in emotional word processing

Anna Hatzidaki[1], Cristina Baus[2], Albert Costa[1]

[1]Universitat Pompeu Fabra & University of Athens, [2]Universite D'Aix-Marseille
ahatzidaki@gmail.com, baus.cristina@gmail.com, costalbert@gmail.com

Drawing on exemplar-based theories of phonological representation (e.g., Goldinger, 1998; Johnson, 1997; Pisoni, 1997), the main question in the present study was whether affective connotations of emotional words might be modulated by accented speech. In particular, we looked at the effects of foreign accent when the meaning of a word referent was maintained (cf. Hanulíková et al., 2012), but there was a difference between stored phonological representations of a native variety and their phonological variants of foreign accented speech. Could a discrepancy between these two lead to differential emotion effects? To address this question, we used the Event Related Potential (ERP) technique, and recorded the cerebral activity of Spanish native listeners who performed a semantic categorization task on neutral and emotional words produced with a native or foreign accent. The results showed that the amplitude of the Late Positive Complex (LPC), associated with emotional language processing (Citron, 2012; Kotz & Paulmann, 2011), was larger for emotional than for neutral words, and even more so in native than in foreign accented speech. We interpret semantic modulation of affective connotations by assuming insufficient activation of links connecting phonological representations and emotion-laden episodic representations in foreign accented speech than in native accented speech.

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The mis-production of TSM final stops

Man-ni Chu

Fu Jen University
mannichu@gmail.com

Taiwan Southern Min (TSM) is known for its unreleased final stops, [p,t,k,ʔ], while the dominant lingual franca in Taiwan is Mandarin Chinese (MC), allowing none of them. A production (18[1] TSM/MC bilinguals) and a perception (15) experiment were conducted to examine how the unreleased final stops were produced and perceived by those bilinguals.

The perpetual results show that identification of /-t/ in /at/ was misperceived as /-k/, while that of /-k/ in /-ak/ was correct. On the other hand, the median values of each stimulus of each speaker were calculated the slopes of the F1/F2, since the transitions of the second formant (F2) determinate the adjacent unreleased stops' place of articulation. The results indicate that the F2 of [ak] merged into that of [ap]. The mis-production of [ak] as [ap] does not necessary lead to the misperception of [ak] as [ap]. The well-produced [at] was significantly misperceived as [ak] because they are acoustic similar in terms of the locus effect.

Table 1: the confusion matrix of [ap,at,ak,aʔ]

	[ap]	[at]	[ak]	[aʔ]
[p]	**44.6%**	24.1%	27.4%	15.4%
[t]	10.2%	21.4%	14%	12.1%
[k]	32.1%	**36.6%**	**41.4%**	33.8%
[ʔ]	13%	17.9%	17.1%	**38.8%**

[1] All listeners passed the pretest threshold of 9/12, showing that they are able to identify the corresponding alphabet with the coda sound they heard.

Figure 1: The F1/F2 profile of [ap,at,ak]

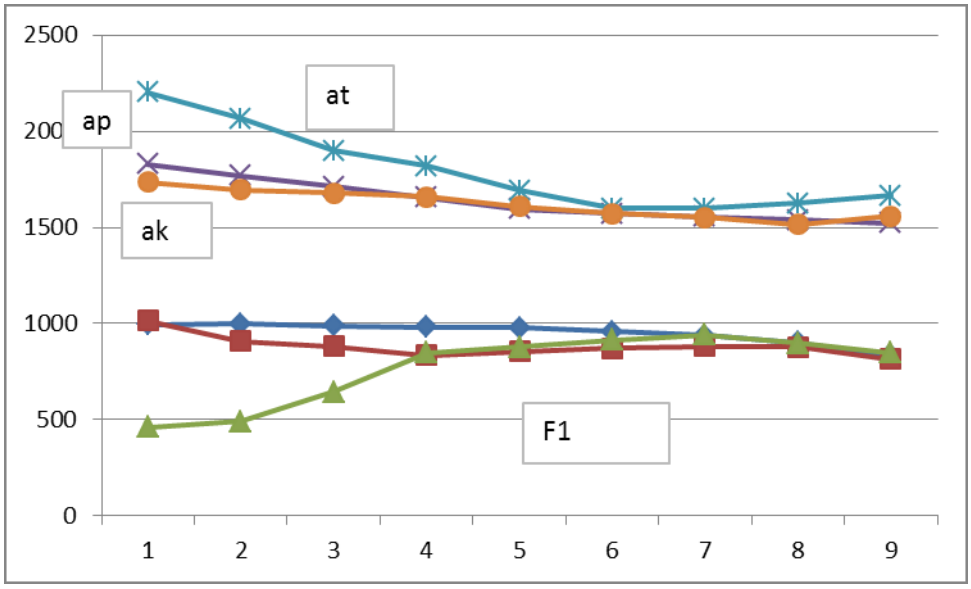
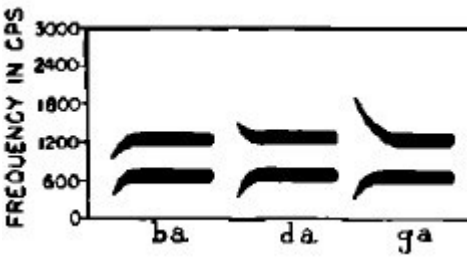


Figure 2: the synthesized F1/F2 when the [a] accompanied with different places of articulation (Delattre et al. 1955)



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Effect of Phonotactic Constraints on L2 Speech Processing

Tamami Katayama

Prefectural University of Hiroshima
katayamat@pu-hiroshima.ac.jp

In this study, we examined whether phonotactic constraints of the first language affect speech processing by Japanese leaners of English and whether L2 proficiency influences it. Native English speakers (ES) and L2 speakers with a high level of language proficiency (JH) and those with low level (JL) took part in a monitoring task. They were given two kinds of sound stimuli as target syllables (i.e., CV and CVC) and were asked to detect them in lists of words that have stress on the first or second syllable (e.g., *biscuit* and *beside*). The results showed that both stress and phonotactics facilitated segmentation strategies by the three groups, but their ways of responding were different. JL detected CVC target syllables faster regardless of the placement of stress, whereas JH identified both CV and CVC target syllables faster when they were embedded in words in which stress is on the first syllable. This difference might have arisen from L2 proficiency and LH's way of processing was also different from that of ES. The interlanguage, which is different from L1 and the target foreign language, can be a bias for L2 learners and make them develop their own ways of L2 speech processing.

Adaptation to foreign accents: The role of listener language experience and task expectations

Cynthia Blanco, Hoyoung Yi, Rajka Smiljanic

University of Texas at Austin
cynthiapblanco@gmail.com, yulia523@gmail.com, rajka@austin.utexas.edu

Previous work has established that listeners can adapt to accent changes rapidly (Baese-Berk et al. 2013; Bradlow & Bent, 2003; Clarke & Garrett, 2004; Witteman et al. 2013). Furthermore, processing was delayed less when listeners were trained to expect accent changes (Floccia et al. 2009). However, it is not well understood how listeners' experiences with other languages and accents condition adaptation to accent variation. In the present study, five listener groups included monolingual Texans with little or no formal exposure to Spanish, early and late Spanish-English bilinguals, and early and late Korean-English bilinguals. Participants heard four blocks of English sentences, with Blocks 1 and 4 produced by native speakers of American English and Blocks 2 and 3 produced by native speakers of Spanish or Korean. Results indicated that a change in accent temporarily delayed processing for all listener groups, but differences emerged for listeners' language background and whether they learned English early or late. Late Korean-English bilinguals were less delayed by Korean-accented speech than the other listeners, while early Spanish-English bilinguals processed Spanish accents most slowly. Adaptation to foreign-accented speech was mediated by both language familiarity and task expectations. Processing delays are analyzed in light of intelligibility and accentedness measures.

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Bias or Not：Cross-linguistic Perception in Accented-speech

Hongyan Wang Shenzhen

University, PR China
Wanghongyan0069@hotmail.com

Bias in Speech perception causes problems. Detailed maps for the bias are necessarily needed to be explored. This research focuses on cross-linguistic speech perception bias caused by the interference of native languages of speakers. The loss incurred by L2 speakers when they communicate with native L1 listeners will be analyzed. The differences in intelligibility among L2 English speakers of diverse national back-grounds will be presented by detailed confusion matrices, such as Chinese-accented speakers of English versus Dutch-accented speakers. The first aim of our study is to test the hypotheses that (i) linguistic-distance works on bias of accented speech perception, as Dutch-accented English vs. Chinese-accented English, and (ii) native speakers benefit from L1 and L2 speakers benefit from the shared L2s. We recorded a male and a female speaker of (American) English, of Dutch English and of Chinese English with five types of English materials for each speaker: vowel, consonant (cluster), and word and sentence test. In this talk we will present a detailed analysis of the confusion structure in the perceptual structure of vowel and consonant contrasts in English. The characteristics of different confusion patterns for each speaker and listener group will provide the acoustic parameters in accented speech perception.

Perception of Acoustic Emotion Cues in Normal-Hearing Listeners and Cochlear-Implant Users

Steven Gilbers[1], *Christina Fuller, Dicky Gilbers,*
Mirjam Broersma, Martijn Goudbeek, Rolien Free, Deniz Başkent

[1]University of Groningen, Center for Language and Cognition Groningen
stevengilbers@gmail.com (Corresponding author)

Due to the limitations in sound transmission in the electrode-nerve interface, cochlear-implant users are unable to fully perceive the acoustic emotion cues in speech. Therefore, it has been suggested that they use different perceptual strategies than normal-hearing listeners, namely by adapting the relative importance of vocal emotion cues (Winn, Chatterjee & Idsardi, 2011).

The present study investigates whether normal-hearing listeners and cochlear-implant users indeed employ different emotion recognition strategies. To this end, voice actors were recorded pronouncing a nonce word in multiple emotions. These recordings' pitch-related acoustic cues were analyzed phonetically, and the recordings were used to test normal-hearing listeners' and cochlear-implant users' emotion recognition. Subsequently, these analyses' results were used to model both groups' perceptual strategies.

Normal-hearing listeners outperformed cochlear-implant users in emotion recognition, even when presented with cochlear-implant simulated stimuli. Unlike cochlear-implant users, however, normal-hearing listeners recognized one particular actor's emotions worse than the other actors'. The groups thus behaved differently when presented with similar input, supporting the different strategies hypothesis. Considering the respective speaker's deviating pronunciation regarding mean pitch and pitch range, it appears that for normal-hearing listeners, mean pitch is a more salient cue than pitch range, whereas cochlear-implant users are biased towards pitch range cues.

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Divergence in the perception of lexical stress by cochlear implant and normal hearing listeners

David Morris

University of Copenhagen
dmorris@hum.ku.dk

Prosodic cues are often degraded as they are transmitted through the electrical-neural interface via which cochlear implant (CI) recipients hear. An attempt was made to counter this degradation in a laboratory experiment involving CI and normal hearing listeners. This involved the use of individual voice pitch and intensity discrimination thresholds as the reference for variation of a disyllable where stress position signaled a distinctive semantic contrast. Isolated and concurrent cue variation that was intended to simulate stress was introduced to the syllables of a non-stressed exemplar and subjects identified the word that they had heard. The normal hearing group exhibited a bias towards the response alternative with stress on the initial syllable which was the unmarked member. The CI group was biased towards the response alternative with stress on the final syllable which was the marked member. Candidate causes for this divergence include signal path delay through the device, pitch reversal, and fine vowel quality differences, yet none of these adequately account for the bias that was observed. This paper will consider these causes along with an alternative explanation that involves CI listeners employing a different listening mode when attending to salient variation in speech acoustic cues.

Sounds in context: electrophysiological evidence for local bias in auditory processing

Ethan Weed

Aarhus University
weed.ethan@gmail.com

A sound is never just a sound. It is becoming increasingly clear that auditory processing is best thought of not as a one-way afferent stream, but rather as an ongoing interaction between interior processes and the environment. Even the earliest stages of auditory processing in the nervous system are colored by contextual information. This can be longterm contextual information, such as knowledge of phonological or emotional categories, but can also be short-term local expectancies, such as the previous sound heard. In this paper, I present original electrophysiological data illustrating the early time-course of contextual influence on auditory processing in three different paradigms: a simple mismatch negativity paradigm with tones of differing pitch, a multi-feature mismatch negativity paradigm in which tones were embedded in a complex musical context, and a cross-modal paradigm, in which auditory processing of emotional speech was modulated by an accompanying visual context. I then discuss these results in terms of their implication for how we conceive of the auditory processing stream.

Reduced influence of prior perceptual knowledge in autism: Evidence from auditory localisation

Joshua Skewes, Line Gebauer

Interacting Minds Centre, Aarhus University & Centre of Functionally Integrative Neuroscience, Aarhus University Hospital
filjcs@cas.au.dk, line.gebauer@psy.au.dk

Autistic people have a more detailed perceptual experience of the world. Competing theories explain this in one of two ways: either as a tendency to represent more (and more precise) sensory information; or as a tendency to rely less on non-conscious prior perceptual knowledge to reduce the over-abundance of data that the sense organs transmit. The present study tested these explanations against one another, by directly examining how autistic and non-autistic peoples' judgments of auditory location were affected by stimulus precision and by prior perceptual knowledge. We found no difference between autistics and non-autistics in the ability to discriminate stimuli from different auditory locations. We did, however, find an effect of prior knowledge, with autistic peoples' perceptual judgments of auditory location being less affected by the prior rate at which stimuli were presented to the right or to the left auditory channel. We interpret this as evidence that increased detail in autistic perception is due to a decreased tendency in autism to use prior perceptual knowledge to reduce sensory data in perceptual inferences. We speculate from this that perceptual differences in autism are expressions of a different style of perceptual learning, specifically that autistic perception is rooted more in direct sensory evidence than in recent prior knowledge.

Top-down processing optimally tunes perception and learning of degraded speech

Ediz Sohoglu

University College London, Ear Institute

e.sohoglu@ucl.ac.uk

Most neural and cognitive accounts of speech perception propose hierarchically organized levels of representation that mediate the mapping between acoustic input and meaning. A longstanding debate is whether information flow within this hierarchy proceeds in a strictly bottom-up fashion or whether abstract linguistic representations (e.g. of words or phonemes) are able to modulate processing at an earlier sensory level so as to enhance subjective experience and the accuracy of perceptual inference (Norris et al., 2000; McClelland et al., 2006). In this talk I will present studies that strongly suggest the involvement of top-down processing during perception and learning of degraded spoken words. I will begin by describing behavioural experiments that manipulate listeners' prior knowledge of non-acoustic (phonological) content in speech by presenting matching or nonmatching text before degraded spoken words (Sohoglu et al., 2014). We show that matching text enhances the perceived clarity of degraded speech, and critically, this influence is time-limited by the duration of auditory-echoic memory, consistent with top-down modulation of acoustic processing by higher-level phonological knowledge. Convergent evidence comes from the spatiotemporal pattern of speech-evoked neural responses (measured with EEG and MEG) that is uniquely consistent with a top-down account: when speech clarity is enhanced by prior knowledge from matching text, activity changes in frontal regions before changes in a hierarchically earlier peri-auditory region of the temporal lobe (Sohoglu et al., 2012). I will finish by presenting more recent, unpublished work in which we show that neural changes in peri-auditory responses that are driven by prior knowledge during immediate perception also contribute to longer-term perceptual learning. Thus, our work suggests that a single mechanism – top-down modulation of sensory processing by higher-level linguistic knowledge – optimally tunes perception as well as learning of degraded speech.

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In the mind of the listener: enculturing through patterned practice

Andreas Roepstorff

Interacting Minds Centre, Aarhus University
andreas@pet.au.dk

How is it that culture creeps under our skin? For more than 125 years, phoneme perception has provided an important case for enculturation. Franz Boas famously argued that systematic listener bias among the field linguists of his time affected not only their ability to pick distinctions in the languages they studied, but also their understanding of the mental world of their informants. This paved a way for a fundamentally *relational* view on culturally shared distinctions. More recently, Neurophysiological investigations have used essentially similar phenomena to elucidate effects of 'culture' and training on the brain. The findings are spectacular and important, and, I will argue, opens for an understanding of enculturing as patterned practice. In interesting ways, this completes a conceptual loop back to Boas.

Interpreting infant vocal distress: the ameliorative effect of musical training in depression

Christine Parsons, Katherine Young, Alan Stein, Morten Kringelbach

University of Oxford
christine.parsons@psych.ox.ac.uk, katie.young@psych.ox.ac.uk, alan.stein@psych.ox.ac.uk, morten.kringelbach@psych.ox.ac.uk

An infant's cry is one of the most emotionally salient sounds in our environment. Depression is known to disrupt a mother's ability to respond to her infant, but it is not well-understood why such difficulties arise. One reason might be that depression disrupts the perceptual abilities necessary to interpret infant's affective cues. Given that musicians are known to have enhanced auditory perception, we assessed whether depression and previous musical training can impact on the ability to interpret distress in infant cries, as manipulated by changes in pitch. Depressed participants with musical training demonstrated better discriminative acuity of distress in infant cry bursts compared to those without. Nondepressed participants, with and without musical training, had levels comparable to musicians with depression. We suggest that previous musical training may act as a protective factor that maintains auditory perceptual abilities in the context of depression. These findings have potential implications for the development of novel training interventions to maintain sensitivity to infant vocal cues in individuals with postnatal depression.

Potentials for bias in a listener's temporal perception of music

Justin Christensen

Aalborg University
justinchr@hum.aau.dk

Recurrent evidence has shown that memory is designed as a means of connecting past experiences with appropriate behavior rather than as an attempt at faithfully storing past events (Damasio 2010). With behavioral direction as the goal, reconstructive memory processes (especially those that impose meaning on the individual's observations of the world) are generally both more beneficial and less costly in memory storage (Bartlett 1932). As a result, the act of memorization has often been described as "interpret, distill and represent" (Huron 2006:101)

In this paper, I investigate how the brain attempts to make sense of and distill musical events into more compressed reconstructions that attempt to 'get the gist of it'. This distillation process often works well for the music listening process, as the temporal nature of music compels the listener to keep up with the pace of the music or become lost. I examine how the listener's memory processes and emotional affect might skew their temporal experience of the music in an attempt to keep pace. I investigate how these factors might influence one into perceiving the music as faster or slower. I especially focus on examples of faster music with its possible requirement of heavier compression and reconstruction from the listener to keep pace.

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Discussion on Pitch Accent: A Case Study

Xuefeng Zhou

Southwest University, China
thatzhou@swu.edu.cn

Pitch accent, the series of rises and falls in pitch over time, is an important perceptual and performing feature in singing -- music and speech processing. Previous research focus on phonetics (e.g. Wang, 2004; Calhoun, 2012) and psychology (e.g. Huron & Royal, 1996), but little care practiced research in cross-culture context. Such study relates to auditory perception. To do this, the Sonic Visualiser (Cook & Leech-Wilkinson, 2009) and an observational method - Extended Self Introspection (Zhou, 2013) – were employed. Using one Chinese folk sung of Jasmine Flower, six different singers' recordings - Celine Dion (English speaker), two Taiwan singers, one Hong Kong singer and two Mainland singers - are compared and analyzed note/sound by note/sound. This study sought to (1) observe Sonic Visualiser graphs; (2) evaluate all pitch accent within these singing editions. Data gathered from (1) and (2) include three inspects of findings: difference of onset detection, fluctuant pitch of vowels and types of glide. Thanks to six singing editions be more distinctive features, these findings reflect singers' speech perception more. The study takes first steps toward verification of performing principles which mapped performer's choices. It also supports the idea that performing style is biased by previous experiences of accent.

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The effect of auditory sensitivity on audiovisual processing

Cecilie Møller[1,2], Andreas Højlund Nielsen[2,3], Niels Christian Hansen[2],
Joshua Skewes[3], Klaus Bærentsen[1], Peter Vuust[2]

[1]Dept. of Psychology, Aarhus University, [2]Centre of Functionally Integrative Neuroscience, Aarhus University, [3]Interacting Minds Centre, Aarhus University
cecilie@psy.au.dk, linahn@cas.au.dk, nchansen@dac.au.dk,
filjcs@cas.au.dk, klaus@psy.au.dk, vuust@cfin.au.dk

Research on the capacity of the human auditory system is important and interesting in its own right, but knowing how sensory systems depend upon each other is fundamental to understanding perception as it unfolds in perceptually rich everyday situations (O'Callaghan 2008). The advantage of having multiple overlapping perceptual systems is evident in everyday life whenever information available to one sensory modality is compromised (Stein et al 2002). The more uncertainty in i.e. the auditory domain, the more we rely on information in the visual modality, as expressed by *the inverse effectiveness principle* of multisensory processing. This principle, amongst others, was first described by Stein and Meredith, 1993, who studied multisensory processing in single neurons in cat superior colliculus.

Here we present preliminary behavioural results from an experiment in progress which studies the enhancement of subtle pitch change detection by the crossmodally corresponding vertical position of visual stimuli (high auditory pitch / high visually perceived vertical position) in humans. The experiment uses neurophysiological (MEG) as well as behavioural (Acc/RT) methods and is designed to provide an answer to the question of whether the beneficial effect of visual information depends on auditory sensitivity, as predicted by *the inverse effectiveness principle*.

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