Sonderforschungsbereich/Transregio 31
"Das aktive Gehör"

E I N L A D U N G

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

Freitag, 10. Januar 2014, 14 Uhr c.t.

im Raum W2 1-143 der Universität Oldenburg
und Raum H28 / R 2.31 des Med. Campus Magdeburg
(per Videoübertragung)

"Hearing is believing: Perceived pitch is best predicted by an inferential model."

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A salient perceptual feature of many sounds is their pitch: the tonal quality that enables sounds to carry melody, to distinguish question from statement in spoken English, or to differentiate syllables in spoken Chinese. Most theories of pitch perception have attempted to identify pitch value with a single physical aspect of the sound -- most often its spectral structure, or the locations of peaks in its summed multi-band autocorrelation function. Such accounts lead naturally to mechanistic neural models, but experimental evidence for the neural responses predicted by these models has been scarce. I will offer an alternative view, in which the percept of pitch is placed within the general framework of Helmoltzian inference. This hypothesised inferential process combines many different physical cues from the sound, as well as contextual information and knowledge of statistical regularities in the environment, to arrive at the final percept. I will show how the inferential account reproduces many well-documented phenomena of pitch perception, as well as behavioural data from new experiments specifically designed to test the hypothesis. I will also discuss an extension to the basic model which associates a sequence of pitches with a non-stationary sound, thus leading to a novel class of pitch-tracking algorithms.

The success of this inferential model in describing behaviour suggests that the psychoacoustic percept of pitch may arise not from circuits specialised for detection of particular acoustic features, but instead from the more general computational mechanisms that underlie auditory pattern recognition; and correspondingly, that the detection of pitch for engineering applications will benefit from taking a similarly general approach.

(Joint work with Phillipp Hehrmann and Vincent Adam)