



UNIVERSITÄT
DES
SAARLANDES

Systems Neuroscience & htw saar Neurotechnology Unit



A Window into the Brain –
How Can Neurotechnology Measure and Influence Attention and Emotions

Daniel J. Strauss

No. # 337

THE DESCENT OF MAN,

AND

SELECTION IN RELATION TO SEX.

BY

CHARLES DARWIN, M.A.,

FELLOW OF THE ROYAL SOCIETY, ETC.

With Illustrations.

NEW EDITION, REVISED AND AUGMENTED.

COMPLETE IN ONE VOLUME.

NEW YORK:
D. APPLETON AND COMPANY,
1889.

of the *pinniculus*; they are also variable in development, or at least in function. I have seen one man who could draw the whole ear forwards; other men can draw it upwards; another who could draw it backwards;²⁸ and from what one of these persons told me, it is probable that most of us, by often touching our ears, and thus directing our attention towards them, could recover some power of movement by repeated trials. The power of erecting and directing the shell of the ears to the various points of the compass, is no doubt of the highest service to many animals, as they thus perceive the direction of danger; but I have never heard, on sufficient evidence, of a man who possessed this power, the one which might be of use to him. The whole external shell may be considered a rudiment, together with the various folds and prominences (helix and anti-helix, tragus and anti-tragus, &c.) which in the lower animals strengthen and support the ear when erect, without adding much to its weight. Some authors, however, suppose that the cartilage of the shell serves to transmit vibrations to the acoustic nerve; but Mr. Toynece,²⁹ after collecting all the known evidence on this head, concludes that the external shell is of no distinct use. The ears of the chimpanzee and orang are curiously like those of man, and the proper muscles are likewise but very slightly developed.³⁰ I am also assured by the keepers in the Zoological Gardens that these animals never move or erect their ears; so that they are in an equally rudimentary condition with those of man, as far as function is concerned. Why these animals, as well as the progenitors of man, should have lost the power of erecting their ears, we cannot say. It may be, though I am not satisfied with this view, that owing to their arboreal habits and great strength they were but little exposed to danger, and so during a lengthened period moved their ears but little, and thus gradually lost the power of moving them. This would be a parallel case with that of those large and heavy birds, which, from inhabiting oceanic islands, have not been exposed to the attacks of beasts of prey, and have consequently lost the power of using their wings for flight. The inability to move the ears in man and several apes is, however, partly compensated by the freedom with which they can move the head in

²⁸ Canestrini quotes Hyrtl, ('*Annuario della Soc. dei Naturalisti*,' Modena, 1867, p. 97) to the same effect.

²⁹ 'The Diseases of the Ear,' by J. Toynece, F.R.S., 1860, p. 12. A distinguished physiologist, Prof. Preyer, informs me that he had

lately been experimenting on the function of the shell of the ear, and has come to nearly the same conclusion as that given here.

³⁰ Prof. A. Macallister, '*Annals and Mag. of Nat. History*,' vol. vii., 1871, p. 342.

a horizontal plane, so as to catch sounds from all directions. It has been asserted that the ear of man alone possesses a lobule; but "a rudiment of it is found in the gorilla;"³¹ and, as I hear from Prof. Preyer, it is not rarely absent in the negro.

The celebrated sculptor, Mr. Woolner, informs me of one little peculiarity in the external ear, which he has often observed both in men and women, and of which he perceived the full significance. His attention was first called to the subject whilst at work on his figure of Puck, to which he had given pointed ears. He was thus led to examine the ears of various monkeys, and subsequently more carefully those of man. The peculiarity consists in a little blunt point, projecting from the inwardly folded margin, or helix. When present, it is developed at birth, and, according to Prof. Ludwig Meyer, more frequently in man than in woman. Mr. Woolner made an exact model of one such case, and sent me the accompanying drawing. (Fig. 2.)

These points not only project inwards towards the centre of the ear, but often a little outwards from its plane, so as to be visible when the head is viewed from directly in front or behind. They are variable in size, and somewhat in position, standing either a little higher or lower; and they sometimes occur on one ear and not on the other. They are not confined to mankind, for I observed a case in one of the spider-monkeys (*Atles belzebuth*) in our Zoological Gardens; and Dr. E. Ray Lankester informs me of another case in a chimpanzee in the gardens at Hamburg. The helix obviously consists of the extreme margin of the ear folded inwards; and this folding appears to be in some manner connected with the whole external ear being permanently pressed backwards. In many monkeys, which do not stand high in the order, as baboons and some species of macaens,³² the upper portion of the ear is slightly pointed, and the margin is not at all folded inwards; but if the margin were to be thus folded, a slight point would necessarily project inwards towards the centre, and probably a little outwards from the plane of the ear; and this I believe to

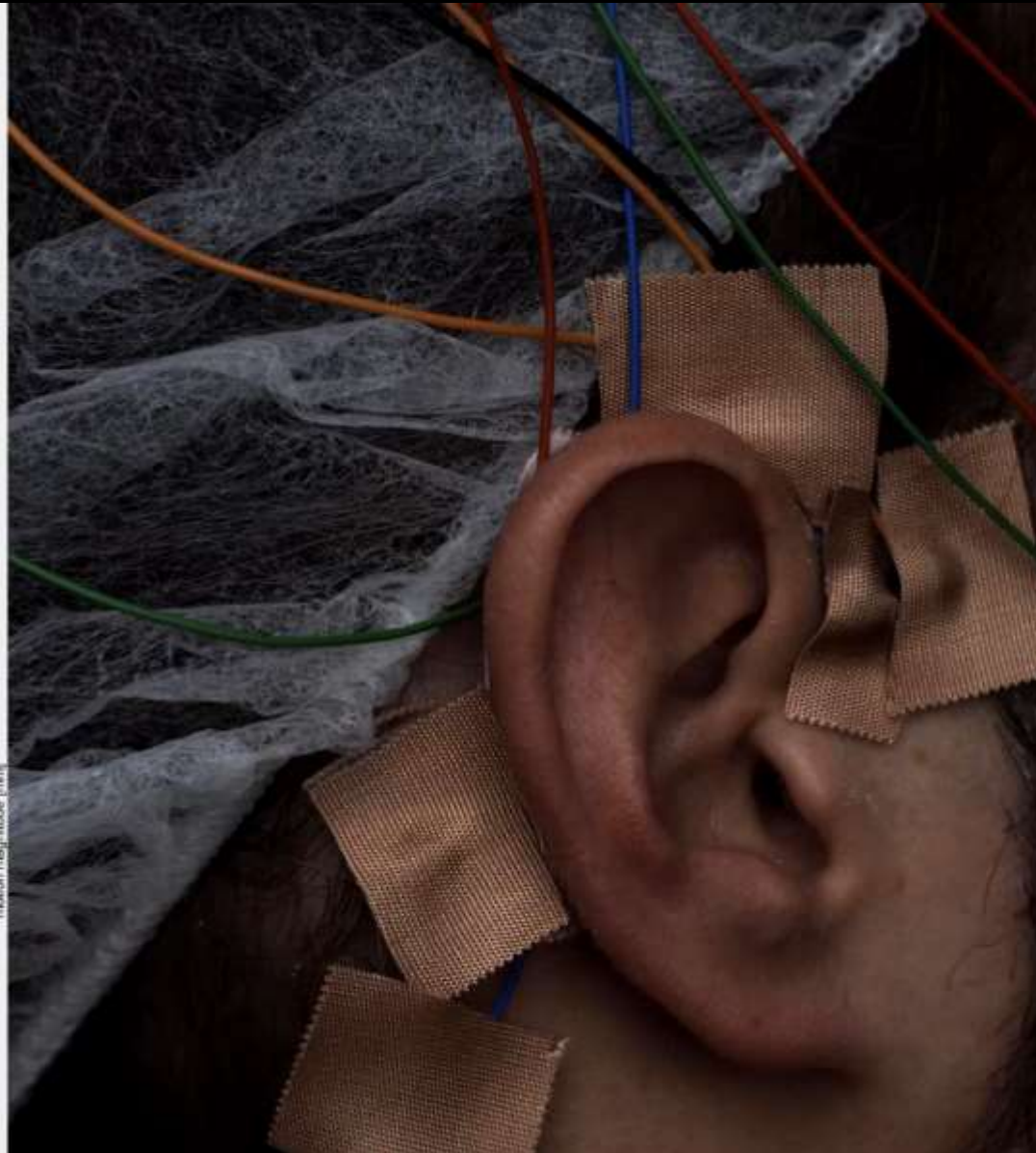
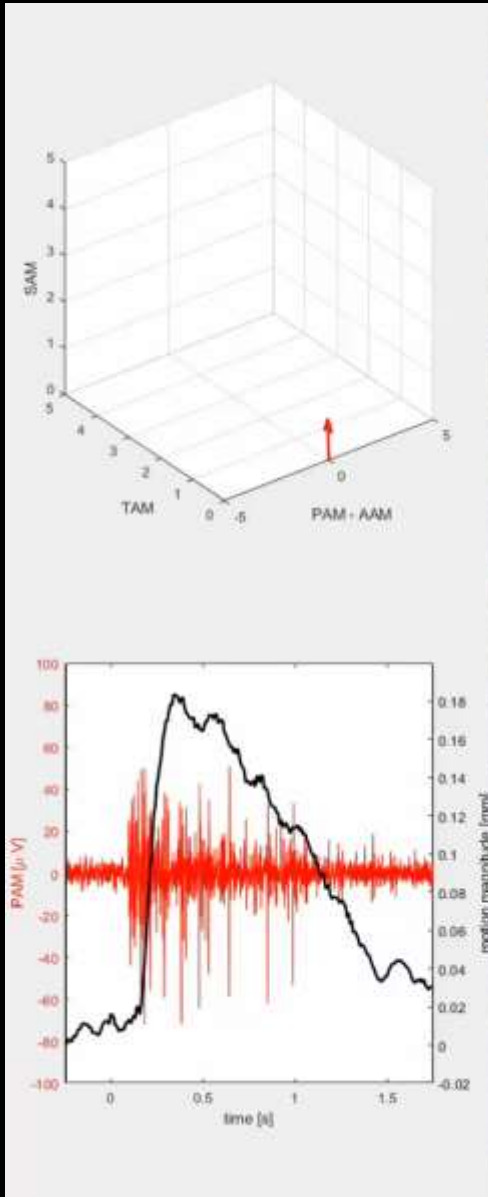


FIG. 2. Human Ear, modelled and drawn by Mr. Woolner.
a. The projecting point.

³¹ Mr. St. George Mivart, '*Elementary Anatomy*,' 1875, p. 396.

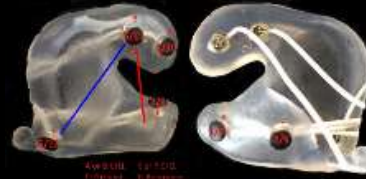
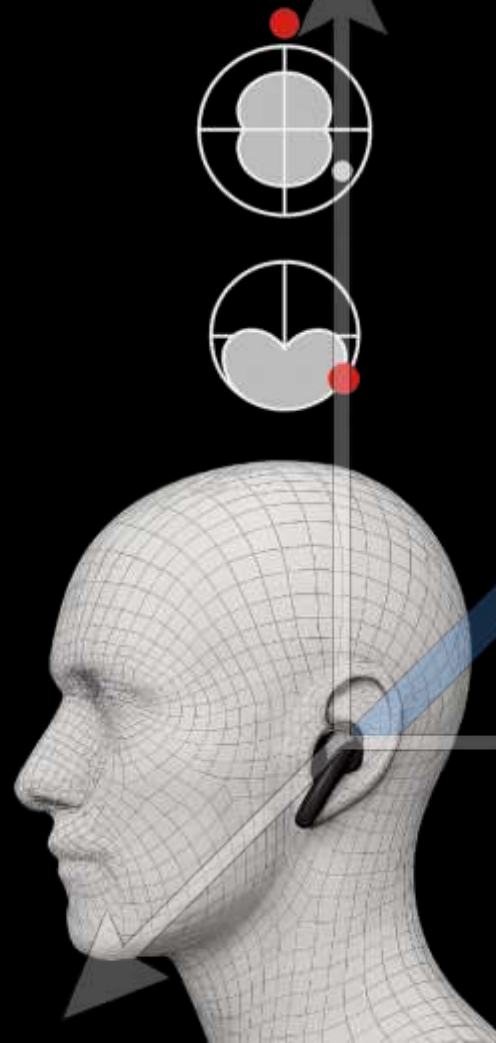
³² See also some remarks, and the drawings of the ears of the

Lemuroidea, in Messrs. Murie and Mivart's excellent paper in '*Transact. Zoolog. Soc.*' vol. vii., 1869, pp. 6 and 90.



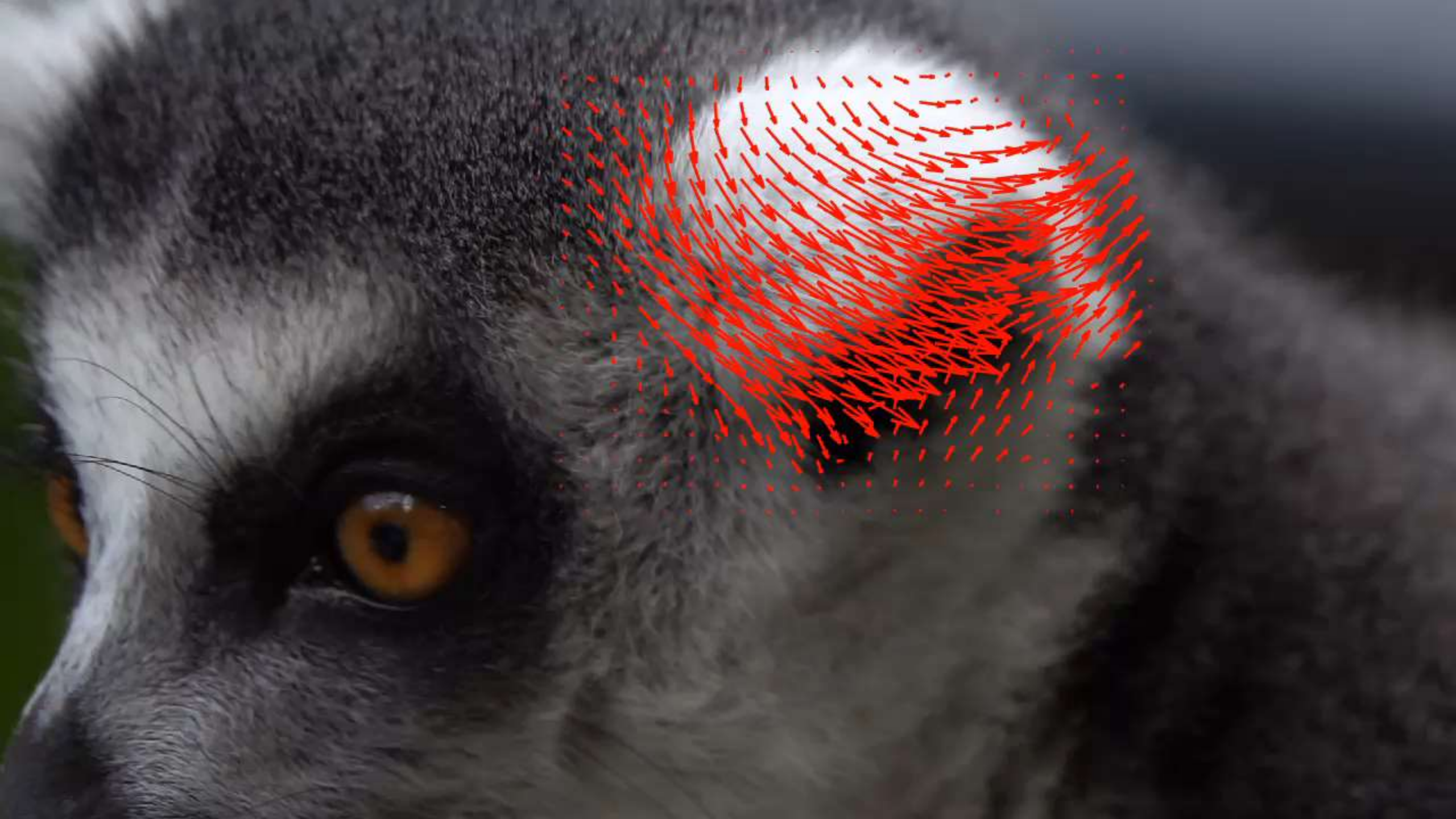


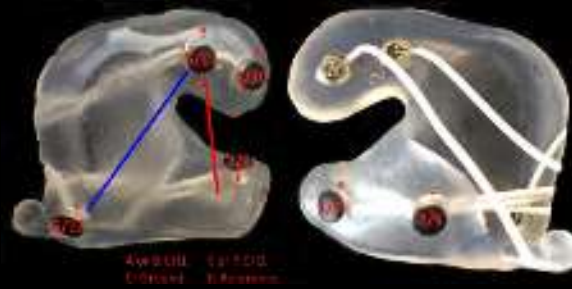
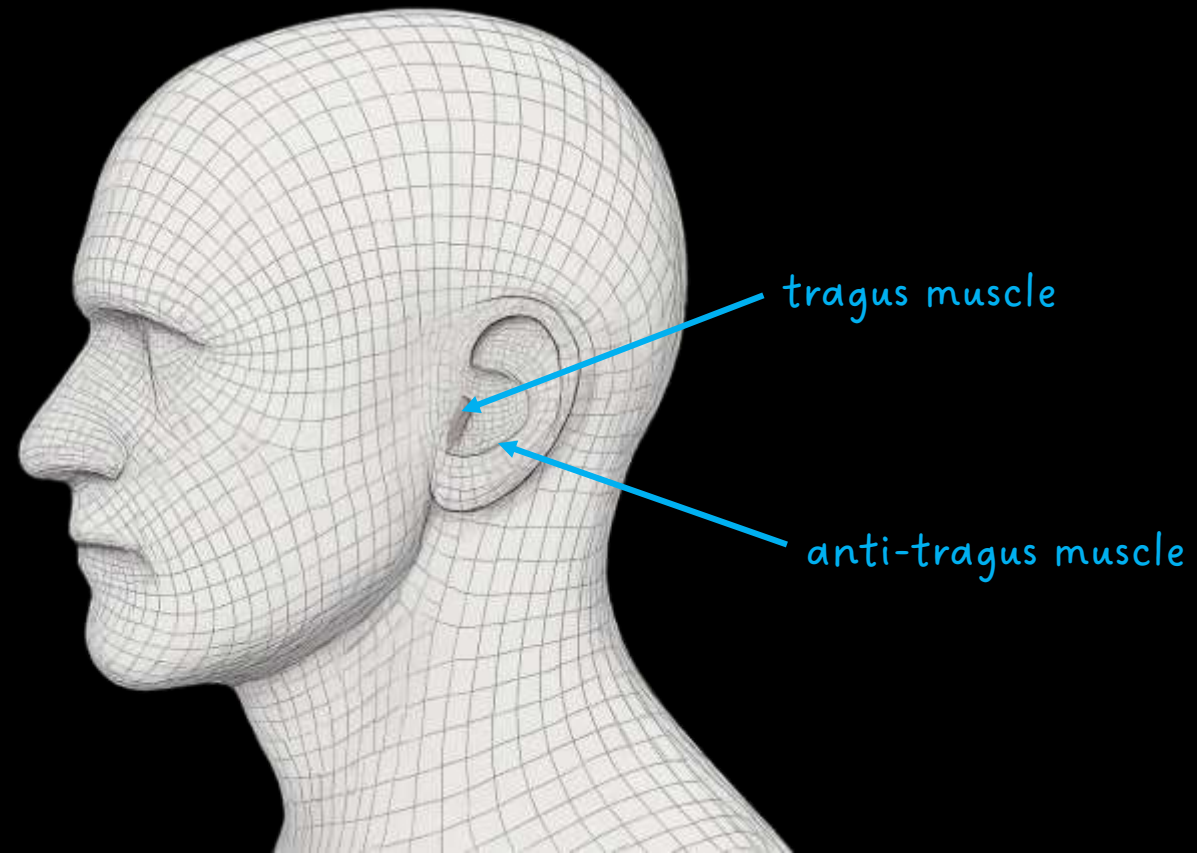
DIRECTIONAL MICROPHONES

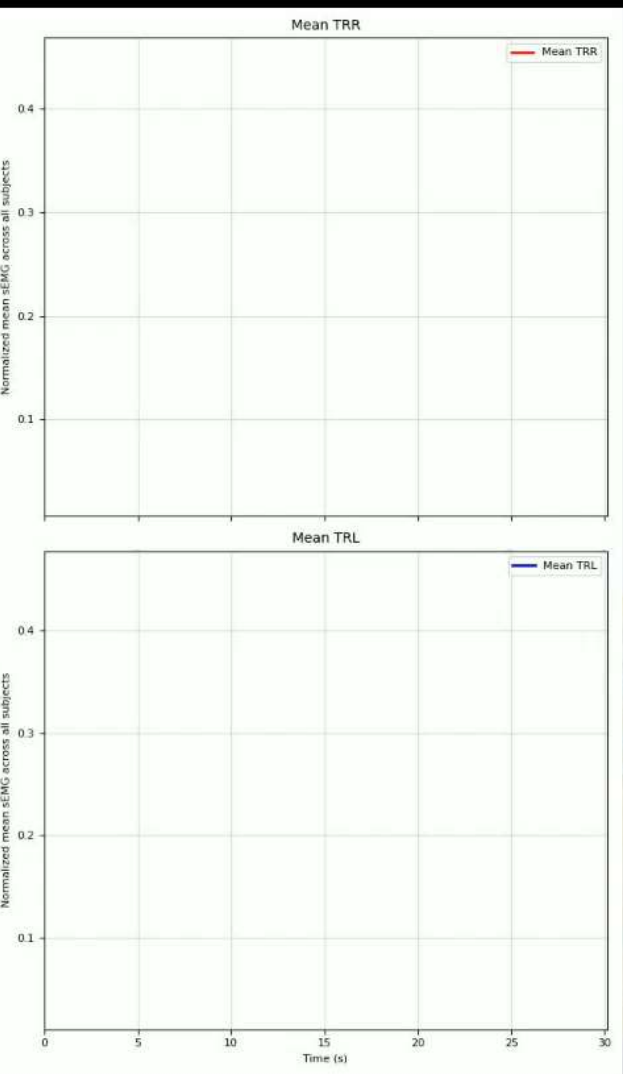


A. Schroeer, F. I. Corona-Strauss, R. Hannemann, S. A. Hackley, D. J. Strauss.
Electromyographic correlates of effortful listening in the vestibular auriculomotor system.
Front Neurosci, 2025

A. Schroeer, M. R. Andersen, M. L. Rank, R. Hannemann, E. B. Petersen, F. M. Rønne, D. J. Strauss, F. I. Corona-Strauss.
Assessment of Vestibular Auriculomotor Activity to Acoustic Stimuli Using Electrodes In and Around the Ear.
Trends in Hearing, 2023



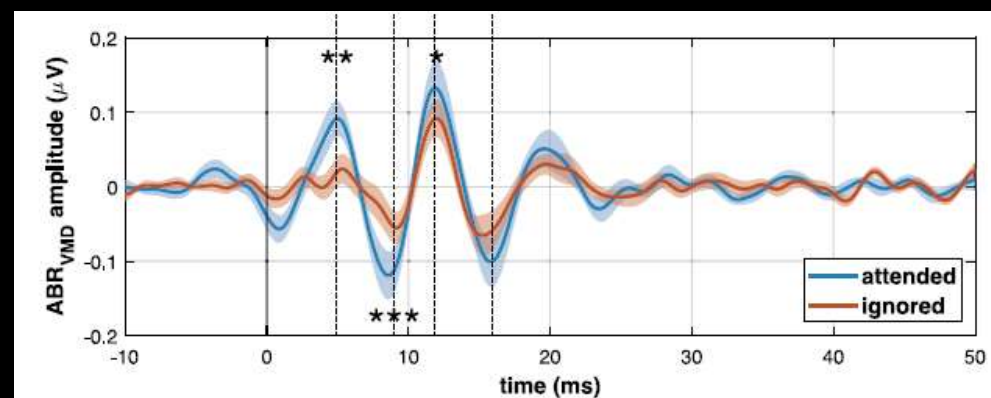
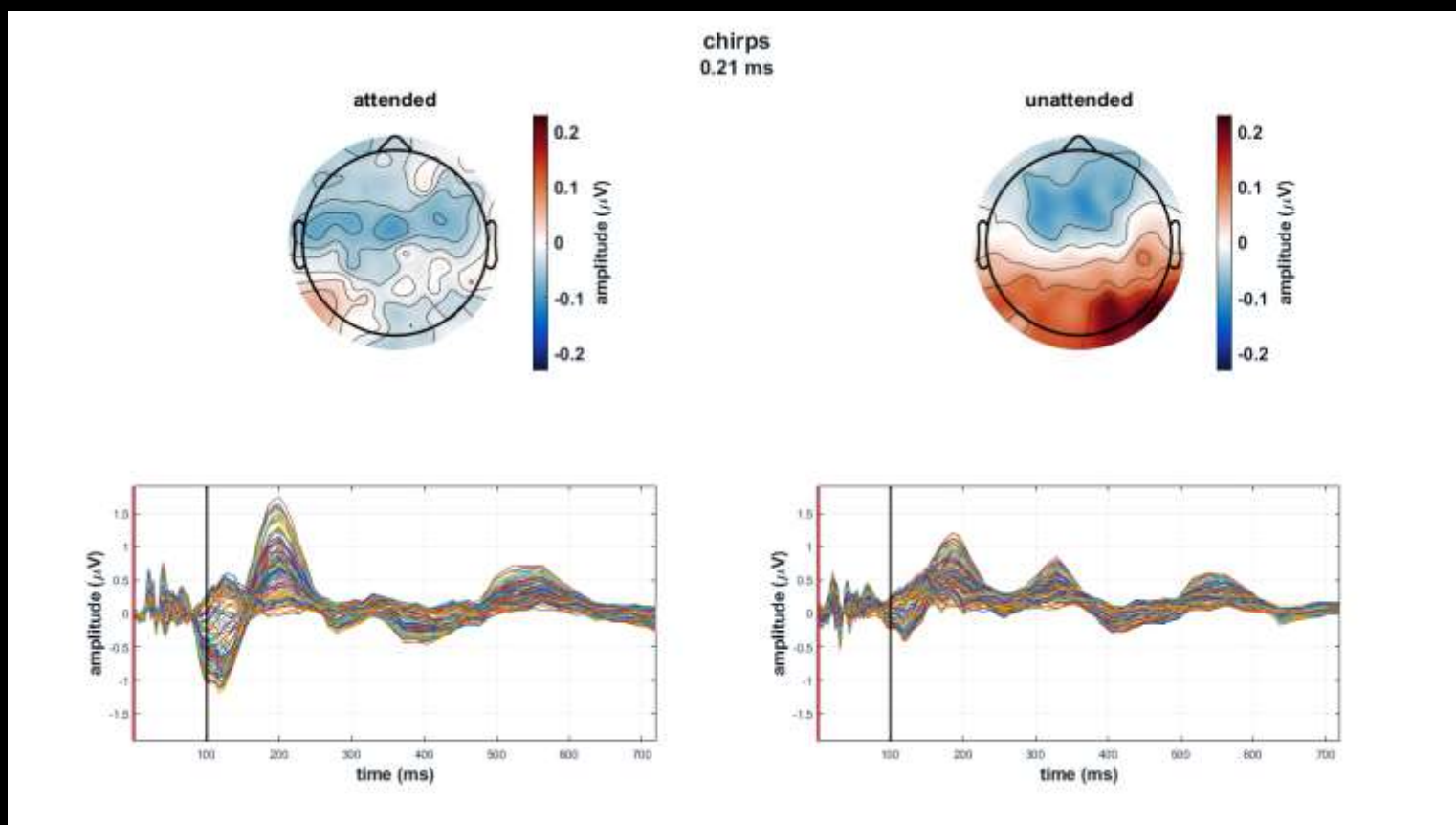






Examples:
 DJ Strauss, AL Francis, J Vibell, FI Corona-Strauss
 The Role of Attention in Sensory Immersion: The two Competitor Model
 Brain Research Bulletin 2024

C Lehser, SA Hillyard, DJ Strauss. Feeling senseless sensations:
 a crossmodal EEG study of mismatched tactile and visual experiences in virtual reality
 Journal of Neural Engineering 2024



Non-Intrusive (Contactless) Neurotechnology

targeting the peripheral nervous system
(autonomic and somatic)

Vehicle Motion Control

Human-Centered Motion Research

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Examples:

EN Schneider, B Buchheit, P Flotho, M Bhamborae, FI Corona-Strauss, F Dauth, M Alayan, DJ Strauss
[Electrodermal Correlates to Motion and Motion Sickness in Highly Automated Driving](#) *IEEE Trans Hum Mach Syst*, 2022

B Buchheit, EN Schneider, M Alayan, F Dauth, and DJ Strauss
[Motion Sickness Prediction in Self-Driving Cars Using the 6DOF-SVC Model](#) *IEEE Trans Intell Transp Syst*, 2022

It seems "unethical" to use high-quality physiological data solely to improve human-machine interaction

Veranstaltungstyp: Präsenz

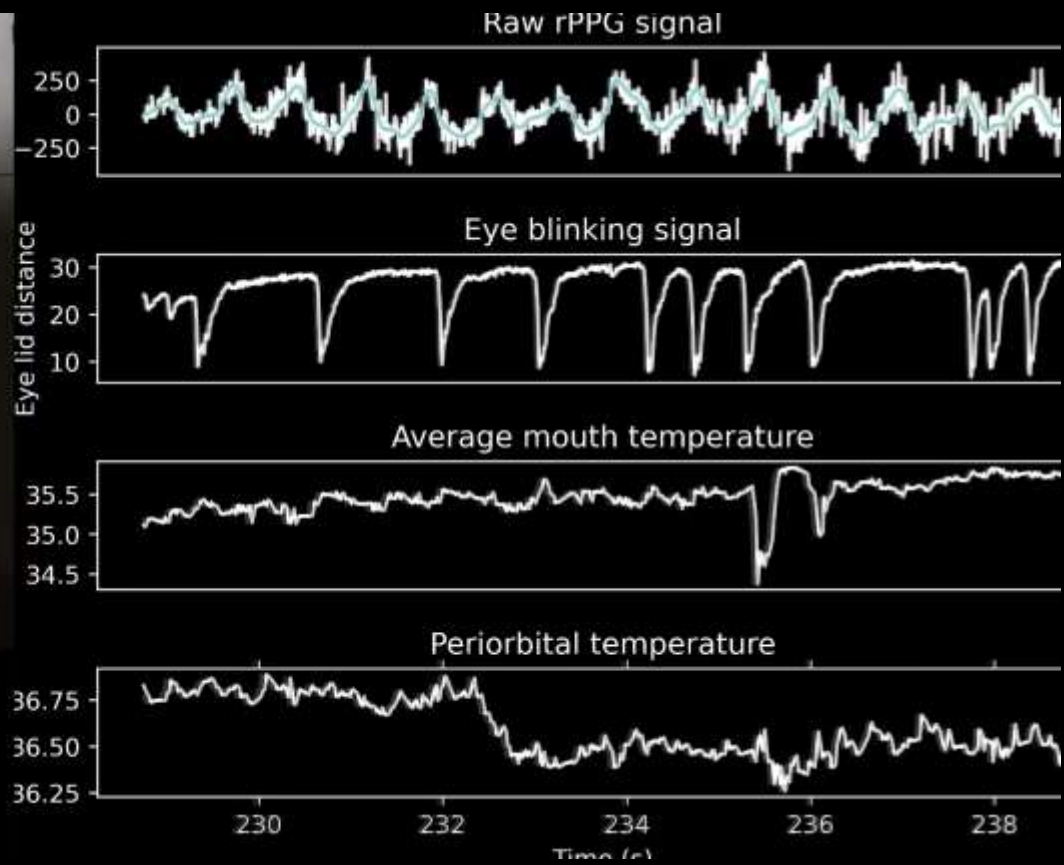
Management und Führung | Gesundheit und Pflege |
Forschung und Entwicklung

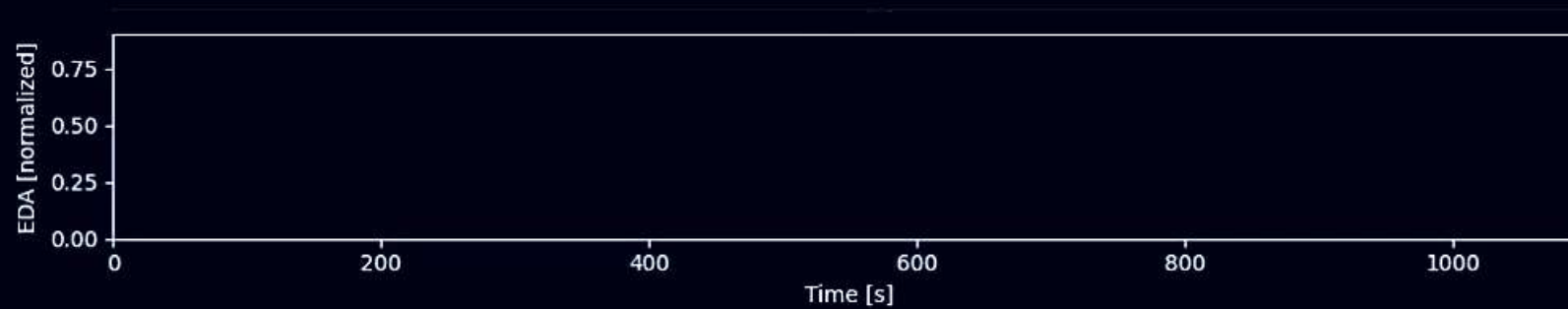
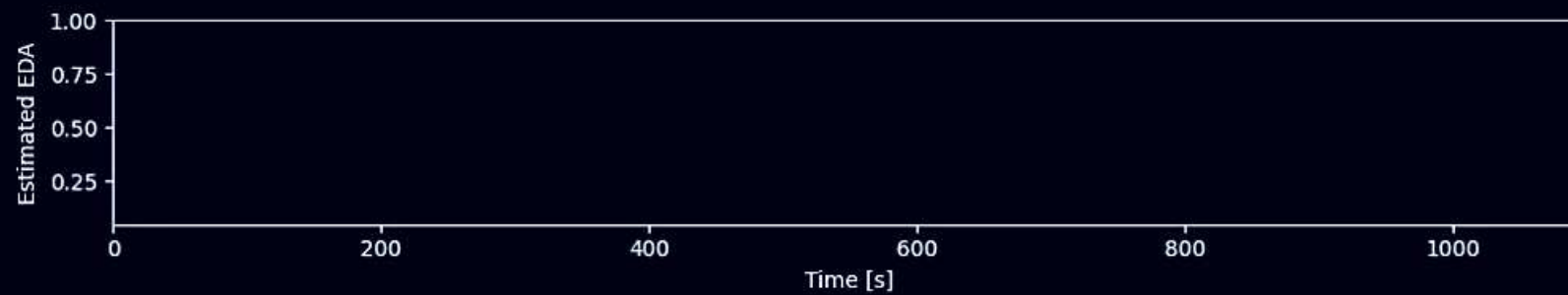
Termin: Am 30.09.2025 von 14:00 bis 19:00 Uhr | Universitätsklinik des Saarlandes

Gesundheit auf Rädern – Automotive Health als Zukunftsfeld der Autoindustrie?

Im Saarland ist mit dem [Zentrum für Digitale Neurotechnologien Saar \(CDNS\)](#) seit seiner Gründung im Jahr 2021 ein bundesweit einzigartiges Kompetenzzentrum entstanden. Gemeinsam mit der Universität des Saarlandes, der htw saar und dem ZeMA erforscht das CDNS, wie digitale Technologien und Neurowissenschaften das Leben von Menschen verbessern können – von der Medizin über die Industrie bis hin zur Mobilität der Zukunft.

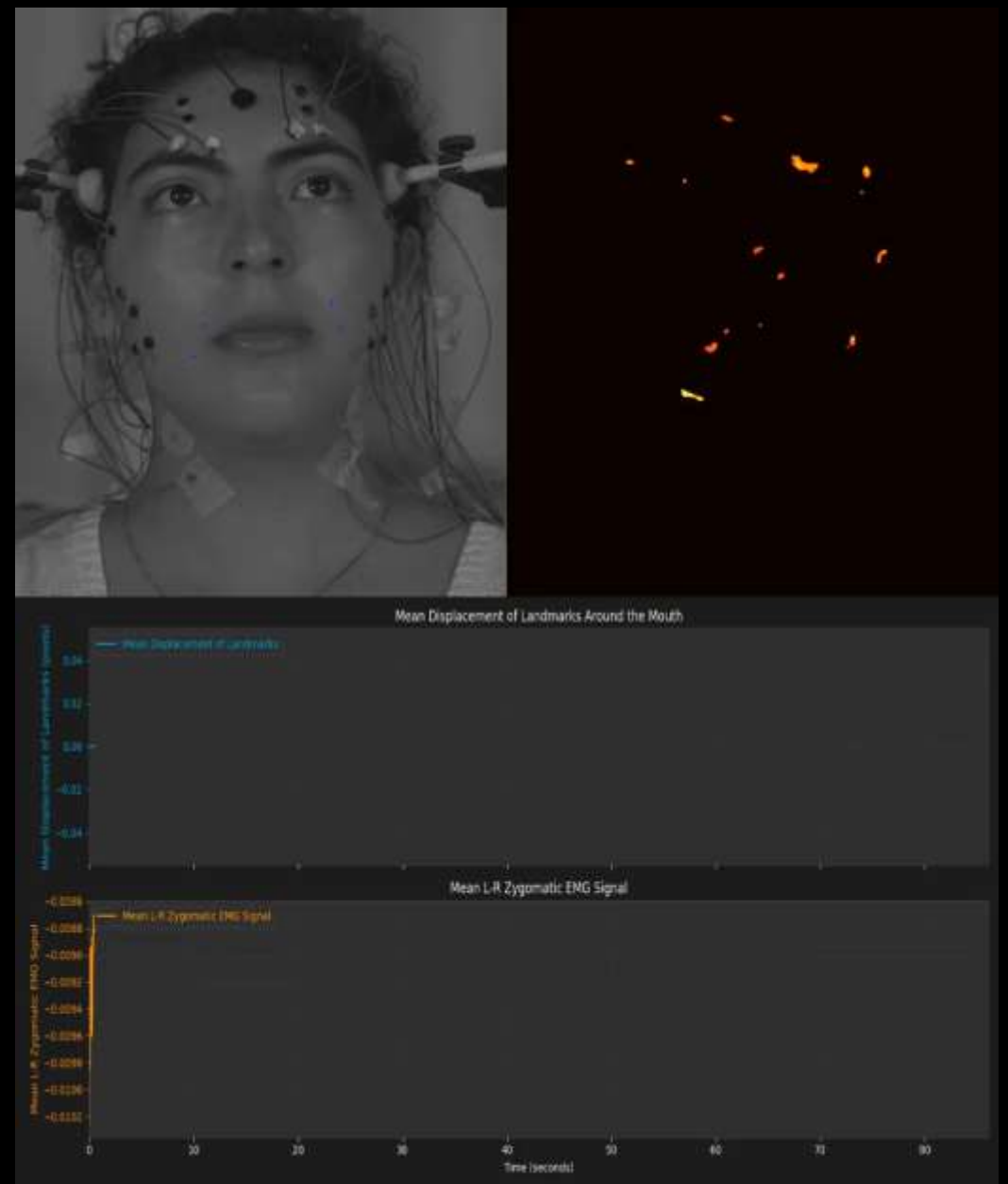
Universitätsmedizin als Schlüsselakteur im Zukunftsfeld Automotive Health



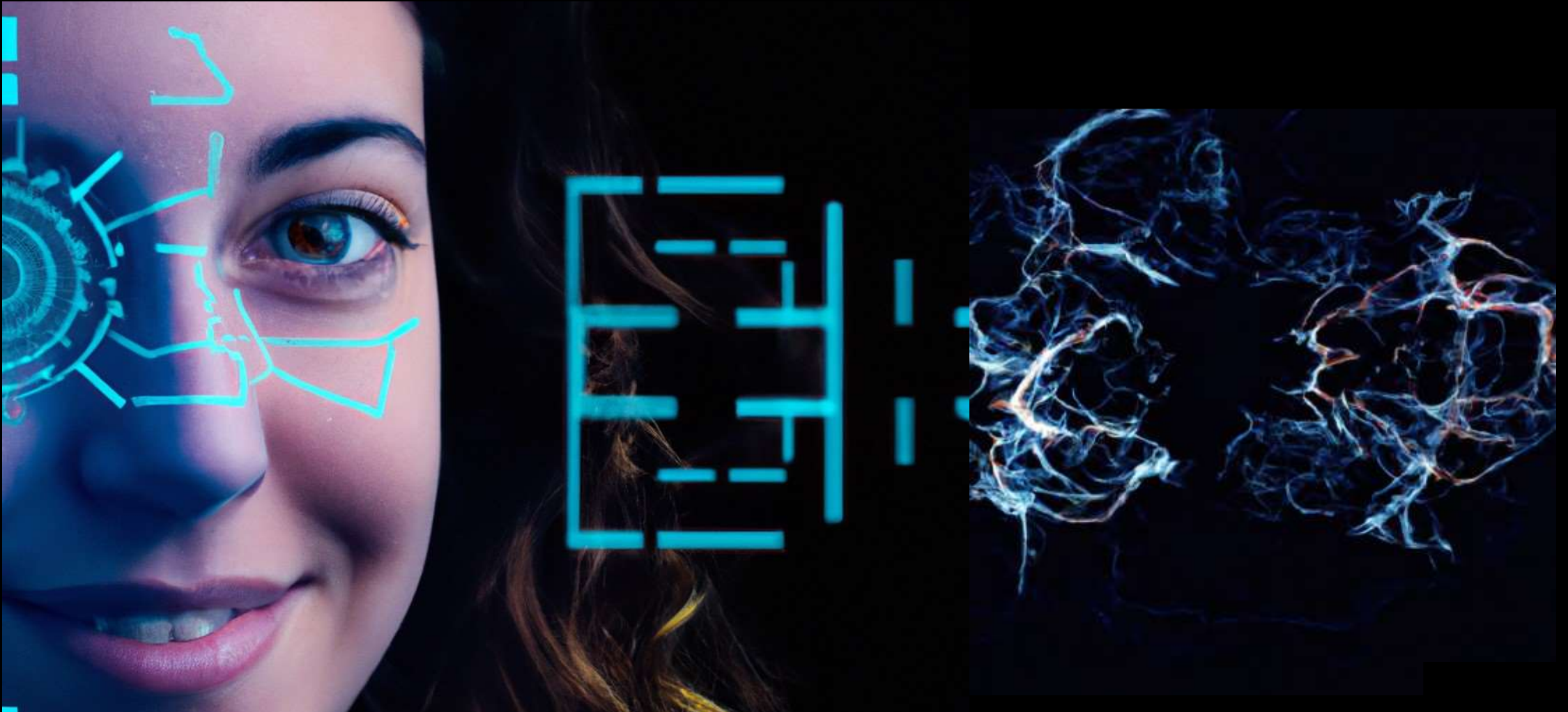


Noisy Speech





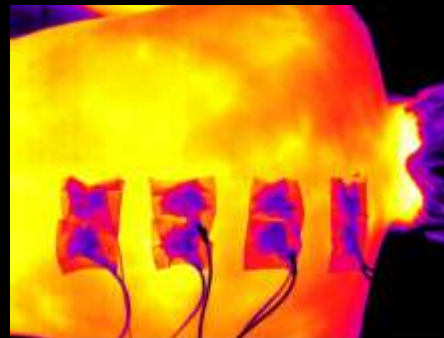
Technology that decodes your physical and mental states,
including your intentions and emotions





Neuroergonomic Human-Machine
Interaction and Environments, e.g.,

Empathetic Machines
or
Multimodal Attention Assistance



A Responsible Use of Opportunities

For instance, ELSI with the help
Citizen Science & Co-Creation



Abbildung 11: Philipp Flotho während seines Beitrags in Arbeitseinheit



Abbildung 16: Prof. Dr. Jilles Vreeken während seines Beitrags in Arbeitseinheit 4



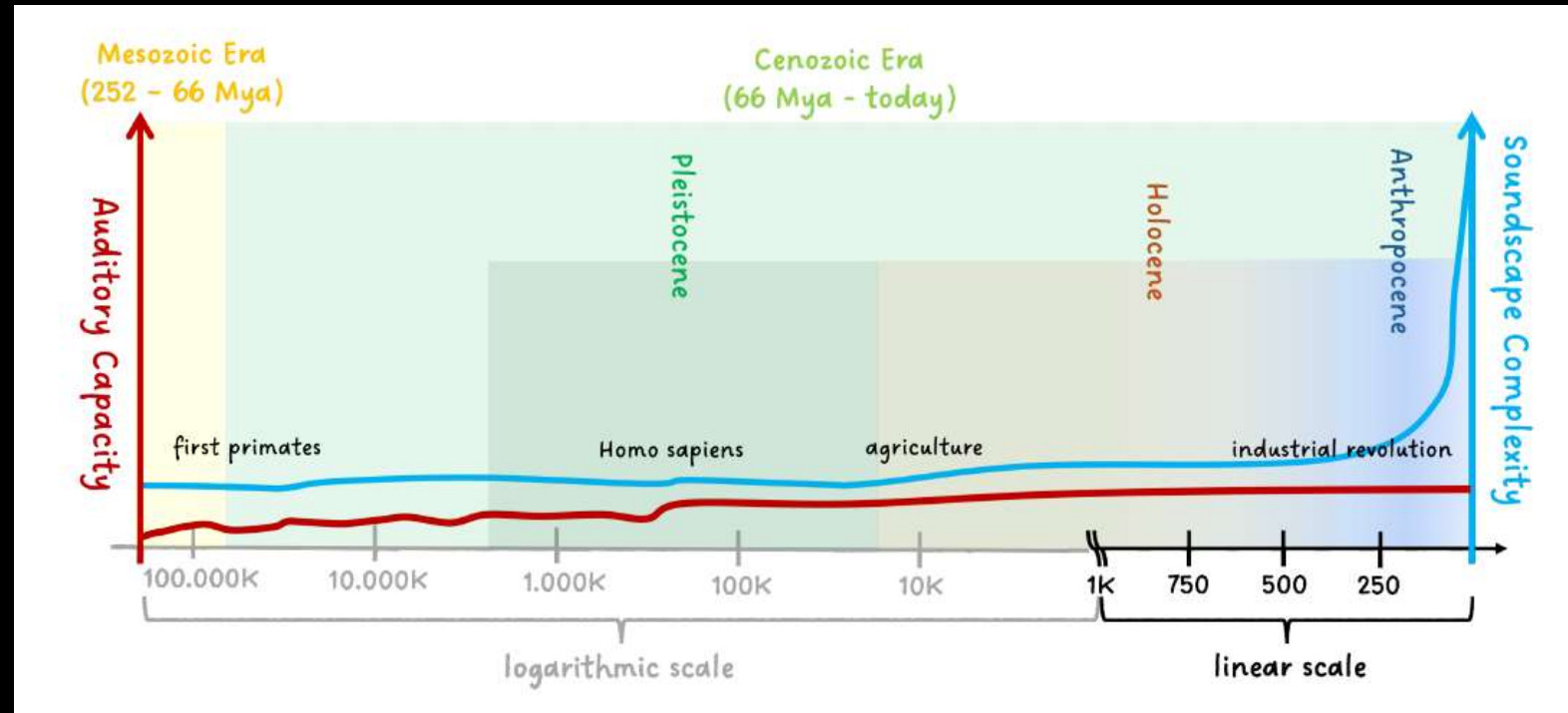
Abbildung 3: Kleingruppendiskussion in Planungszelle 2



Bürgergutachten Kontaktlose Infektionskontrolle an der Kliniktür

im Rahmen des Forschungsprojekts
„Integrierte neuro-technologische Architektur
zum kontaktlosen Screening von virusbedingten
Atemwegserkrankungen“ VI-SCREEN

A Novel Perspective on Neurotech in Everyday Life



DJ Strauss, AL Francis, Z Schäfer, M Latzel, FI Corona-Strauss, S Launer
Understanding Speech in "Noise" or Free Energy Minimization in the Soundscapes of the Anthropocene
Frontiers in Neuroscience, Perspective, 2025



Zoo-Saarbruecken, June, 2021

Thank You For Your
(Endogenous) Attention

