

Prof Dr Dr Friedemann Pulvermüller
Freie Universität Berlin
WS 2014/15
Progress in Brain Language Research
Tue, 6-8pm ct, JK 31/102

Graduate Course/Seminar *Progress in Brain Language Research*

Introduction

This colloquium will focus on recent advances in the investigation of brain mechanisms of language. It is designed for students and young researchers interested in an explanation of how the brain controls speech production, realises language comprehension and connects linguistic symbols with meaning and human interaction. The field of neurolinguistics will be broadly covered, with possible foci on phonological, lexical, syntactic, semantic and pragmatic questions. Further topics will be neurological language deficits, the neuroplastic changes following lesion of language relevant areas of the brain and the learning and relearning of language both in an experimental/language teaching context and in neurorehabilitation. We may also discuss explicit explanatory models of language mechanisms in the human brain. The colloquium will cover cutting edge publications in the brain language domain and current research projects in the Brain Language Laboratory of the Freie Universität Berlin. Ideal participants will aim at a BA, MA or PhD in the brain language sciences and may come from linguistics, psychology, neuroscience, or medicine. Participants may review a recent research publication or will be given an opportunity to present their own research plan or ongoing research project. Presentations of guest scientists will be part of this course.

Recommended readings

Cappa, S. F., & Pulvermüller, F. (2012). SPECIAL ISSUE - Language and the motor system. *Cortex*, 48(7), 785-787. doi: 10.1016/j.cortex.2012.04.010

Kiefer, M., & Pulvermüller, F. (2012). Conceptual representations in mind and brain: Theoretical developments, current evidence and future directions. *Cortex*, 48(7), 805-825. doi: 10.1016/j.cortex.2011.04.006

Pulvermüller, F. (2012). Meaning and the brain: The neurosemantics of referential, interactive, and combinatorial knowledge. *Journal of Neurolinguistics*, 25(5), 423-459. doi: 10.1016/j.jneuroling.2011.03.004

Technicalities

The course is part of the teaching offered by the *Graduate School of Mind and Brain*. It is open to interested students from all departments. It will be offered by Friedemann Pulvermüller together with Guglielmo Lucchese, MD, under the admin support of Sabina Mollenhauer, MA.

To obtain a certificate of attendance, it is necessary to

- attend most of the sessions (maximum misses: three),
- pre- and reprocess the session content by reading the recommended key papers, and
- present a key paper in current brain language research or, alternatively, a detailed research plan or report of own research.

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Presentations should last about 30' and be supported by a powerpoint presentation and handouts to participants. If you are interested in presenting, please discuss your plan with FP directly (preferably during office hours, Wednesdays, 12-1pm, room JK 31/232).

To register for the course, please put your name down on the signup sheet provided at the first session. We will be happy to discuss any questions you may have regarding this course, be it about formalities, your presentation or wider research interests. Please contact one of us:

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Friedemann Pulvermüller

Office: JK 31/232
Sprechstunde: Mi 12-13 Uhr

For more information and updates, please visit:

<http://www.brainlang.fu-berlin.de/teaching>

<http://www.brainlang.fu-berlin.de/talks>

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Seminar Program

Unless otherwise noted, the Seminar will be held from 18:15 – 19:45 h in room JK 31/102 of the main building of the Freie Universität Berlin, Habelschwerdterallee 45, 14195 Berlin.

14.10. Introduction and seminar planning

Friedemann Pulvermüller: Neuronal oscillations and synchrony as language indexes

21.10. Project presentation

Francesca Citron, Cora Kim, Adele Goldberg, Friedemann Pulvermüller et al.: Combinatorial learning of abstract meaning in the brain?

Suggested background reading: Johnson, M. A., & Goldberg, A. E. (2013). Evidence for automatic accessing of constructional meaning: Jabberwocky sentences prime associated verbs. *Lang Cogn Process*, 28(10), 1439-1452.

28.10. - no seminar

04.11. Journal club

Julian Kasciessa: TBA

Jeff Hanna: Are there different brain rhythms for top-down and bottom-up information processing in the cortex?

Suggested background reading: Andre M Bastos, Julien Vezoli, Conrado A Bosman, et al.: Visual areas exert feedforward and feedback influences through distinct frequency channels. *bioRxiv* first posted online May 6, 2014. doi: <http://dx.doi.org/10.1101/004804>

11.11. 16 - 18 h, JK 28/130, Habelschwerdter Allee 45, Dahlem lecture on language

Prof. Dr. Thomas Gloning (Justus-Liebig-Universität Gießen): Multimodale Kommunikationsangebote. Neue Aufgaben und ein paar harte Nüsse für die Textlinguistik, die Sprachtheorie und die Kommunikationsgeschichte

18.11. Journal club

Guglielmo Lucchese: Synchronous oscillations for cortical computation

Suggested background reading: Fries, P. (2009). Neuronal gamma-band synchronization as a fundamental process in cortical computation. *Annu Rev Neurosci*, 32, 209-224. doi: 10.1146/annurev.neuro.051508.135603

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Cora Kim: Synchronous oscillations as indexes of linguistic processes

Suggested background reading: Tallon-Baudry, C., & Bertrand, O. (1999). Oscillatory gamma activity in humans and its role in object representation. *Trends in Cognitive Sciences*, 3, 151-161.

Thursday, 20.11., 19 s.t. - 20:30 h, Mind and Brain Lecture

Berlin School of Mind and Brain, Luisenstraße 56, Festsaal (2nd floor), 10117 Berlin

Prof. Risto Näätänen (University of Helsinki, Finland): The Mismatch Negativity (MMN): A breakthrough biomarker in the prediction of psychosis onset

Suggested background reading: Näätänen, R., Kujala, T., Kreegipuu, K., Carlson, S., Escera, C., Baldeweg, T., & Ponton, C. 2011. The mismatch negativity: an index of cognitive decline in neuropsychiatric and neurological diseases and in ageing. *Brain*, 134(Pt 12), 3435-3453. doi: 10.1093/brain/awr064

25.11. Invited Lecture:

Dr. Vadim Nikulin (Charite Universitätsmedizin Berlin, CBF): Long-range Temporal Correlations in Neuronal Oscillations

Suggested background reading: Nikulin, V. V., & Brismar, T. (2005). Long-range temporal correlations in electroencephalographic oscillations: Relation to topography, frequency band, age and gender. *Neuroscience*, 130(2), 549-558. doi: 10.1016/j.neuroscience.2004.10.007

02.12. Research update – Berlin trial on Intensive Language Action Therapy (BILAT)

Lisbeth Frølund (Hammel Neurocenter, Aarhus, Denmark): Constraint-Induced Aphasia Therapy in Sub-Acute Neurorehabilitation: Issues of Applicability

Benjamin Stahl: Aphasia therapy – result of a recent RCT

Bettina Mohr: Aphasia therapy – an anti-depressant?

Guglielmo Lucchese: Mismatch negativity as an efficacy index of aphasia therapy?

Felix Dreyer: Word-evoked potentials as an efficacy index of aphasia therapy?

Background reading: Berthier, M. L., & Pulvermüller, F. (2011). Neuroscience insights improve neurorehabilitation of post-stroke aphasia. *Nature Reviews Neurology*, 7(2), 86-97.

09.12. – no seminar

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16.12. 14 h: Invited lecture:

Dr. Caterina Breitenstein (Universität Münster): From controlled experimental trial to everyday communication: How effective is intensive speech and language therapy in aphasia under routine clinical conditions?

Suggested background reading: Breitenstein, C., Grewe, T., Floel, A., Ziegler, W., Springer, L., Martus, P., & Baumgartner, A. 2014. How Effective is Intensive Aphasia Therapy under Routine Clinical Conditions? The German Randomised Controlled Multicentre Trial FCET2EC. *Sprache-Stimme-Gehör*, 38(1), 14-19. doi: DOI 10.1055/s-0033-1358457

13.01. Research update

Cora Kim: Brain and behavioral correlates of color word learning

Rosario Tomasello: A neurocomputational model of the time course of semantic brain activation

Suggested background readings: Boutonnet, B., Dering, B., Vinas-Guasch, N., & Thierry, G. (2013). Seeing objects through the language glass. *Journal of Cognitive Neuroscience*, 25(10), 1702-1710.

Garagnani, M., Wennekers, T., & Pulvermüller, F. (2008). A neuroanatomically-grounded Hebbian learning model of attention-language interactions in the human brain. *European Journal of Neuroscience*, 27(2), 492-513.

16.01. 10 – 12 h: Lecture at Humboldt Universität zu Berlin (room TBA):

Friedemann Pulvermüller: Action-Perception Mechanisms for speech sound perception and production

Suggested background reading: Miozzo, M., Pulvermüller, F., & Hauk, O. (2014). Early Parallel Activation of Semantics and Phonology in Picture Naming: Evidence from a Multiple Linear Regression MEG Study. *Cerebral Cortex*, in press/online, doi: 10.1093/cercor/bhu137

20.01. Research Update

Tally Miller et al.: Sensational language: learning and brain activation to touch and newly learnt words

Marta Wąsik (Pomeranian Medical University, Szczecin): TBA

27.01. 16 – 18 h, JK 28/130, Habelschwerdter Allee 45, Dahlem lecture on language

Dr. Bert Cappelle (University of Lille): title TBA

Suggested background readings: Cappelle, B., Shtyrov, Y., & Pulvermüller, F. (2010). Heating up or cooling up the brain? MEG evidence that phrasal verbs are lexical units *Brain and Language*, 115(3), 189-201.

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03.02. Invited lecture

Prof. Dr. Christine Mooshammer (Humboldt Universität zu Berlin): title TBA

10.02. Research Update & Journal Club

Luigi Grisoni: Mismatch Negativity and Readiness Potential as indicators of semantic priming and expectation

Max Garagnani: Learning new symbols for actions and objects: Brain and behavioral correlates

Papers proposed for discussion:

Bruyer, R., & Brysbaert, M. (2011). Combining speed and accuracy in cognitive psychology. *Psychologica Belgica*, 51(1), 5-13.

Dick, A. S., Bernal, B., & Tremblay, P. (2014). The Language Connectome: New Pathways, New Concepts. [Review]. *Neuroscientist*, 20(5), 453-467. doi: 10.1177/1073858413513502

Dick, A. S., & Tremblay, P. (2012). Beyond the arcuate fasciculus: consensus and controversy in the connectonal anatomy of language. [Review]. *Brain*, 135(Pt 12), 3529-3550. doi: 10.1093/brain/aws222

Mottonen, R., van de Ven, G. M., & Watkins, K. E. (2014). Attention fine-tunes auditory-motor processing of speech sounds. [Research Support, Non-U.S. Gov't]. *J Neurosci*, 34(11), 4064-4069. doi: 10.1523/JNEUROSCI.2214-13.2014

Rogers, J. C., Mottonen, R., Boyles, R., & Watkins, K. E. (2014). Discrimination of speech and non-speech sounds following theta-burst stimulation of the motor cortex. *Front Psychol*, 5, 754. doi: 10.3389/fpsyg.2014.00754

Smalle, E. H., Rogers, J., & Mottonen, R. (2014). Dissociating Contributions of the Motor Cortex to Speech Perception and Response Bias by Using Transcranial Magnetic Stimulation. *Cereb Cortex*. doi: 10.1093/cercor/bhu218

Special topic: NEURONAL SYNCHRONY AND OSCILLATIONS

Fries, P. (2005). A mechanism for cognitive dynamics: neuronal communication through neuronal coherence. *Trends Cogn Sci*, 9(10), 474-480. doi: 10.1016/j.tics.2005.08.011

Fries, P. (2009). Neuronal gamma-band synchronization as a fundamental process in cortical computation. [Review]. *Annu Rev Neurosci*, 32, 209-224. doi: 10.1146/annurev.neuro.051508.135603

Engel, A. K., Fries, P., & Singer, W. (2001). Dynamic predictions: oscillations and synchrony in top-down processing. *Nature Reviews Neuroscience*, 2(10), 704-716.

Pulvermüller, F., Birbaumer, N., Lutzenberger, W., & Mohr, B. (1997). High-frequency brain activity: its possible role in attention, perception and language processing. *Progress in Neurobiology*, 52(5), 427-445.

Singer, W., Engel, A. K., Kreiter, A. K., Munk, M. H. J., Neuenschwander, S., & Roelfsema, P. R. (1997). Neuronal assemblies: necessity, signature and detectability. *Trends in Cognitive Sciences*, 1, 252-262.

Singer, W., & Gray, C. M. (1995). Visual feature integration and the temporal correlation hypothesis. *Annual Review in Neuroscience*, 18, 555-586.