Curriculum Vitae – Jeff Hanna

Personal Information

Name: Jeffrey Scott Hanna
Birthdate: Dec. 9, 1980
Birthplace: Mobile, Alabama, USA
Nationality: USA
Residence: Berlin, Germany (since 2012)
Email: jeff.hanna@gmail.com

Education

Harding University	Bachelor of Arts	Biblical Philology	2003
Oxford University	Master of Philosophy	Cuneiform Studies	2006
Cambridge University	Master of Philosophy	Applied Linguistics	2007
Cambridge University	Doctor of Philosophy	Neurolinguistics	2011

Research Interests

My work is primarily concerned with measuring the realisation of language in the human brain, with particular focus on second language learning and morphology. Ambitions for future research include the application of more sophisticated techniques of brain data analysis toward testing newer linguistic theories, which see language less as a collection of isolated faculties, and more as an integrated information stream, fundamentally incorporated into the entire human cognitive system.

Employment

University of Cambridge **2007-2011** **PhD Student**
and Medical Research Council – Cognition and Brain Sciences Unit (MRC-CBU)
Project which used MEG and behavioural methods to study the syntactic capabilities of non-native speakers of English of varying degrees of proficiency. Supervisors: John Williams and Friedemann Pulvermüller

Université catholique de Louvain **2011** **Post-doctoral researcher**
Designed, carried out, and analysed EEG experiments investigating the processing of syntax, among adults, typically developing children, and children with language or other psychological disorders. Supervisor: Heather van der Lely†

Freie Universität Berlin **2012-present** **Wissenschaftlicher Mitarbeiter**
Research, management of EEG lab, and teaching, in service of the Brain Language Laboratory and the Institut für Deutsche und Niederländische Philologie. Supervisor: Friedemann Pulvermüller

Skills

Languages: English (native speaker), German (advanced-intermediate)
Information technology: Python (advanced), Matlab (expert), R, Linux, Windows, very good problem-solving skills with both hardware and software, proficient with language corpus use.
Neuroimaging: Highly proficient with EEG and MEG, conversant with advanced methods (source localisation, multi-variate pattern analysis, oscillations, signal decomposition e.g. ICA). Highly proficient with MNE-Python, SPM, EEGLAB, and Fieldtrip.

Recent Conferences

Neurobiology of language, 2014, Amsterdam: "Sicherheit and Sauberkeit in the brain: evidence that complex words are handled simply." Poster presentation.
MMN Conference, 2015, Leipzig: "MMN distinguishes rule-based and arbitrary processes in

language." Poster presentation.
MMN Conference, 2015, Leipzig: "Can the MMN measure proficiency in a second language?" Symposium presentation.
Neurobiology of language, 2016, London: "Spread the word: MMN brain response reveals whole-form access of discontinuous verbs."

Academic Publications

Hanna, J., Mejias, S., Schelstraete, M.-A., Pulvermüller, F., Shtyrov, Y., & Van der Lely, H. K. (2014). Early activation of Broca's area in grammar processing as revealed by the syntactic mismatch negativity and distributed source analysis. Cognitive neuroscience, 5(2), 66-76. doi:10.1080/17588928.2013.860087

Hanna, J., & Pulvermüller, F. (2014). Neurophysiological evidence for whole form retrieval of complex derived words: a mismatch negativity study. Frontiers in human neuroscience, 8:886. doi: 10.3389/fnhum.2014.00886

Hanna, J., Shtyrov, Y., Williams, J., & Pulvermüller, F. (2016). Early neurophysiological indices of second language morphosyntax learning. Neuropsychologia, 82, 18-30. doi: 10.1016/j.neuropsychologia.2016.01.001

Lucchese, G., Hanna, J., Autenrieb, A. Miller, T.M.C. Pulvermüller, F. (2016) Electrophysiological Evidence for Early and Interactive Symbol Access and Rule Processing in Retrieving and Combining Language Constructions. Journal of Cognitive Neuroscience. doi: 10.1162/jocn_a_01038

Hanna J, Cappelle B, Pulvermüller F. (under review) Spread the word: MMN brain response reveals whole-form access of discontinuous verbs.

Hanna J, Cappelle B, Pulvermüller F. (in preparation) Early brain responses reflects entropy and conditional probability of separable-affix verb morphemes.

Courses Taught

Aufbauseminar - Einführung in die Neurolinguistik (Introduction to neurolinguistics)
Vertiefungsseminar – Morphologie (Advanced seminar, morphology)
Vertiefungsseminar – Theorien über die Grammatik (Advanced seminar, theories of grammar)
Vertiefungsseminar – Neurosemantik und –pragmatik (Advanced seminar, neurosemantics and pragmatics)

Software developed

ANOAR (https://github.com/jshanna100/ANOAR): Automatic non-ocular artefact rejection, add-on for MNE-Python. Independent component analysis and signal space projection are powerful tools for removing ocular-based noise from neurophysiological signals, but before they can function well, data must be cleaned, often by hand. This is laborious and also dependent on the often subjective judgment of the data cleaner. Noise detection algorithms on the other hand tend to focus on the not-yet removed ocular noise which would be best removed later by ICA/SSP. ANOAR uses information from the EOG signal to downweight and ignore noise caused by ocular movement, and remove the noise that is not.

Cross-validated MVPA for MNE-Python: A suite of tools which computes multivariate cross-validated Mahalanobis distance for neurophysiological data, adapted from the techniques used for fMRI data, described in Walther et al, 2016, NeuroImage. Computes and displays RDMs, time-resolved contrasts of desired conditions. There are also powerful visual tools for visualsing the results of multiple dimensional scaling of the RDMs into 2- and 3d space, including the ability to scroll quickly through the time course, and fit spheres or discs onto specific conditions to see how distance relationships change through the epoch.

Pointstool: A programme which takes data from 3d electrode position tracker systems, and enables quick, intuitive identification and removal of erroneous data points. The programme then extrapolates the location of all electrodes from a smaller sample, and integrates the results into SPM for source localisation. Data are visualised and manipulated within a GUI.

Balancer: A programme which takes a large set of data, where each member has n characteristics, and finds a subset where variance on these characteristics are simultaneously minimised or maximised as desired, by realising set members as points in n-dimensional space, fitting ellipsoids

onto possible subsets, and measuring dimension-weighted least-squares goodness of fit of all possible subsets. Data are visualised and manipulated within a GUI.