CAROLE
Centre for Applied Research and Outreach in Language Education

Dipartimento di Studi Umanistici
Università degli Studi di Pavia

UNIVERSITY of GREENWICH

Second Language In The Brain 3

Instruction
Immersion
Interaction

University of Greenwich, October 4th 2014

	Event
9:30 – 10:00 am	Registration
10:10 – 10:50 am	*Opening and Welcome* Professor Judith Burnett, Pro Vice-Chancellor, Faculty of Architecture, Computing and Humanities Professor Alessandro Benati, Director of CAROLE Short video message from Professor Noam Chomsky, MIT, USA
10.50 – 11:00 am	**Teachers and Developmental Linguists pose key questions to Neurolinguists** Alessandro Benati, University of Greenwich & Stefano Rastelli, University of Pavia
11:00 – 11:50 am	**Language, memory, and brain: The role of long-term memory systems in first and second language** Professor Michael Ullman, Georgetown University, USA
11:50 – 12:40 pm	**Event-related brain potentials as metrics of non-native language learning and loss** Professor Lee Osterhout, University of Washington, USA
12:40 – 1:40 pm	*Lunch Break*
1:40 – 2:30 pm	**Electrophysiological changes during word or grammar learning and the role of feedback** Dr. Dough Davidson, Basque Center on Cognition, Brain, and Language, Spain
2:30 – 3:10 pm	**Language control in the bilingual brain: Why the interactional context matters** Professor David W. Green, University College London, UK
3:10 – 4:00 pm	**ERP profiles in bilingualism: Effects of age of acquisition, language proficiency, L1-L2 interactions, and L1 attrition after L2 immersion** Professor Karsten Steinhauer, McGill University, Canada
4:00 – 4:15 pm	*Break*
4:15 – 4:55 pm	**Round Table** **Leah Roberts,** University of York & **Jason Rothman,** University of Reading
5:00 – 5.30 pm	*Closing and Wine Reception*

Symposium

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A partnership between the Department of Humanities - University of Pavia and the Centre for Applied Research and Outreach in Language Education (CAROLE) - University of Greenwich

Introduction

The human brain undergoes both functional and anatomical changes to cope with the task of learning a second language in adulthood. Folk-science gurus and market-sellers have been advertising brain-compatible L2 teaching methods since the early Eighties, when theories about lateralization of language-related functions began to inspire the popular division of teaching-units between “analytical” (left-centered) and “creative-emotional” (right-centered) classroom activities. Since then, assuming that the learning brain must react in predictable ways to grammar drills or to ‘singing along’ has always appeared to many qualified teachers as the best way to provide their job with a scientific flavour.

In this Symposium, we would like to ask three basic questions: is teaching useful (whether explicit or implicit)? Does language immersion and naturalistic exposure really make a difference? Does the kind of spoken interaction among native and non-native speakers count for language acquisition? The novelty of the current symposium does not lie in the questions, but in the kind of answer: *complex* and *experimentally-grounded* answers only will be provided. Indeed, it has only been quite recently that ERPs and neuroimaging techniques have been used to explore the impact that some environmental factors may have on changes in the brain occurring during second language acquisition. The symposium focuses on three of these environmental factors: (a) classroom instruction; (b) interaction among native and nonnative speakers; (c) immersion and everyday life in the country where the second language is spoken. Research questions to be addressed in the Symposium include the following: Are there visible brain signatures of increasing proficiency in the second language? Are different memory systems (declarative vs. procedural) involved in a different way in uninstructed and in instructed second language acquisition? How does an adult learner's brain accommodate (if it does) to the typical activities of a language classroom setting such as structured or enhanced input, drills, repetitions and so forth? Are there brain modifications which can be

directly or indirectly linked to the fact that the second language is used and practiced outside the class in everyday life? Is it likely that feedback (in any of its forms) and interaction with native speakers modify the quality of Second Language Acquisition in ways that are detectable in brain activity patterns? The Symposium brings together neurolinguists who have been leading research on these topics since the late Nineties and theoretical & developmental linguists who are known worldwide for their research in the field of SLA.

Speakers:

Michael Ullman (Georgetown University)

Lee Osterhout (University of Washington)

Doug Davidson (Basque Center for Cognition, Brain, and Language)

David Green (University College London)

Karsten Steinhauer (McGill University)

Discussants:

Leah Roberts (University of York - discussant)

Jason Rothman (University of Reading - discussant)

Organizers:

Alessandro Benati (Greenwich University)

Stefano Rastelli (University of Pavia)

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Abstracts

MICHAEL ULLMAN (GEORGETOWN UNIVERSITY)

Language, memory, and brain: The role of long-term memory systems in first and second language

Increasing evidence suggests that language learning and use depend on two long-term memory systems in the brain, declarative memory and procedural memory, which are also found in other vertebrate species. Because the behavioral, anatomical, physiological, molecular and genetic correlates of these two systems are quite well-studied in animals and humans, they lead to specific predictions about language that would not likely be made in the more circumscribed study of language alone. This approach is thus very powerful in being able to generate a wide range of new predictions for language – including for first and second language, individual differences, and a range of language disorders. I will first give background on the two memory systems, and then discuss the manner in which language is predicted to depend on them. One of the key concepts is that to some extent the two systems can subserve the same functions (e.g., for navigation, grammar, etc.), and thus they play at least partly redundant roles for these functions. This has important consequences for first and second language, as well as language disorders. I will then present evidence that language does indeed depend on the two memory systems, though in different ways across different populations and learners. I will focus on first and second language. Factors that affect if, when and how each of the two memory systems underlie language include which aspects of language are being learned (idiosyncratic versus rule-governed), age of acquisition, amount of language exposure, and type of language exposure, in particular immersion vs. classroom experience. I will also discuss implications of this research program for enhancing second language acquisition.

Dr. Ullman is Professor in the Department of Neuroscience, with secondary appointments in the Departments of Neurology, Linguistics and Psychology, at Georgetown University. He is Director of the Brain and Language Laboratory and the Georgetown EEG/ERP Lab. His research examines the brain bases of first and second language, how language and memory are affected in various disorders (e.g., autism, Specific Language Impairment, Alzheimer's, Parkinson's and Huntington's diseases), and how factors such as sex, handedness, and genetic variability affect the brain bases of language and memory.

LEE OSTERHOUT (UNIVERSITY OF WASHINGTON)

Event-related brain potentials as metrics of non-native language learning and loss

Second language (L2) learning is a dynamic process, in which the learner gets better over time at processing L2 sounds, words, and sentences. In our lab, we track changes in brain activity that occur as novice learners progress through the early years of classroom-based L2 instruction. The goal is to determine how much L2 experience is needed before learners incorporate L2 knowledge into their on-line comprehension systems. We describe the trajectory of lexical and grammatical learning, and show that (at least in some respects) the process of language attrition is just like the process of language learning – but in reverse. Finally, language learners are known to be highly variable with respect to their rate of learning and ultimate attainment. I will describe work by Darren Tanner and our lab group showing how these individual differences are systematically manifested in event-related potentials.

Lee Osterhout received his Ph.D. from Tufts University in 1990, and is currently a Professor and Director of the Cognitive Neuroscience of Language laboratory at the University of Washington. His lab investigates real-time language processing by recording event-related brain potentials (ERPs) while people read or listen to words, sentences, and larger discourses. He has focused on two populations: adult native speakers and adult language learners. Together with Phil Holcomb, he was the first to report that semantic and syntactic anomalies elicit distinct ERP effects. Subsequently, he and his colleagues have applied ERPs to the study of native language comprehension and, more recently, comprehension in adult second-language learners. He has received research funding from the National Institutes of Health and from the National Science Foundation.

DOUG DAVIDSON (BASQUE CENTER FOR COGNITION, BRAIN, AND LANGUAGE)

Electrophysiological changes during word or grammar learning and the role of feedback

It is not yet clear what type of electrophysiological changes occur in the human brain when second language learners begin acquiring proficiency or skill using a second language. One approach to this problem is to use non-invasive EEG or MEG recordings during language learning tasks to try to uncover broad-scale patterns in evoked or induced activity which may reflect these changes. This talk will describe several lines of research on learning which seek to show the brain changes when learners gain lexical and syntactic knowledge. In addition, we will also discuss the role of cognitive control in the learning process, especially with respect to the role it plays in the response to explicit feedback.

Doug Davidson received his Ph.D. in cognitive psychology from Michigan State University in 2001, followed by postdoctoral work at the University of Illinois in Urbana-Champaign, and the Max Planck Institute for Psycholinguistics in Nijmegen, and the Max Planck Institute for Human and Cognitive Brain Sciences in Leipzig. He is currently a staff scientist at the Basque Center for Cognition, Brain, and Language in Donostia-San Sebastián in the Basque Country of Spain. His main research interests include the electrophysiological correlates of language learning with a focus on oscillatory activity, and also statistical models.

DAVID W. GREEN (UNIVERSITY COLLEGE LONDON)

Language control in the bilingual brain: Why the interactional context matters

Different bilingual communities use their two languages in different ways: some code-switch within a conversational turn, others do not. From this observation, I will argue that different patterns of use induce different habits of language control that mediate effective turn-taking in conversation. This behavioural ecological perspective, I suggest, invites us to think about the ecology of the classroom and its fitness for purpose. I will take up the invitation!

David W. Green (Emeritus Professor in the Faculty of Brain Sciences at University College London) researches the neural representation and control of languages in normal adult bilingual speakers and in those who have suffered stroke.

KARSTEN STEINHAUER (MCGILL UNIVERSITY)

ERP profiles in bilingualism: Effects of age of acquisition, language proficiency, L1-L2 interactions, and L1 attrition after L2 immersion

Event-related brain potentials (ERPs) provide an excellent tool to investigate the temporal dynamics of language processing, including the fascinating neural changes that take place when language learners become more proficient in their L2. In my talk, I will present data from a variety of large-scale ERP studies investigating second language acquisition in both artificial languages and natural languages, at different levels of L2 proficiency. I will argue that there is little evidence for a strict ‘critical period’ in the domain of late acquired L2 morpho-syntax and that L2 proficiency rather than age of language acquisition predicts the brain's activation patterns, including "native-like" activity at very high levels of proficiency. The general dynamics of these changes, however, is modulated by factors such as one's first language background (e.g., ‘transfer effects’) and the type of language exposure (e.g., immersion versus classroom instruction). I will also address similarities and differences between L1 and L2 acquisition, and present the first ERP data demonstrating how long-term immersion in L2 can affect the real-time processing of one’s first language.

Dr Karsten Steinhauer is an internationally renowned cognitive neuroscientist and an associate professor at McGill University in Montreal, Canada. Trained at the Max Planck Institute of Cogntive Neuroscience in Germany (PhD in 2000), he has used ERPs in psycholinguistic research for more than twenty years and has published his original work in influential top-notch journals such as Nature Neuroscience and PNAS. He and his students investigate both the acquisition of well-controlled artificial ‘miniature’ languages and a range of L1-L2 pairings in natural languages to identify the neurocognitive changes underlying second language acquisition, especially in the domains of morpho-syntax and phonology. In order to better understand the role of age of acquisition and proficiency, recent studies also compare the ERP profiles of L2 learners to those of L1 learners and L1 attriters. Dr Steinhauer’s other research interests include interactions at the prosody-syntax interface and similarities between speech and music.

LEAH ROBERTS (UNIVERSITY OF YORK - DISCUSSANT)

Bio: Leah Roberts is Professor of Education and Leader of the Centre for Language Learning Research at the University of York. Following her PhD in second language sentence processing at the University of Essex in 2003, she worked as a post-doctoral researcher at the Max-Planck Institute for Psycholinguistics in Nijmegen for 8 years. Her work focuses on language learning and real-time processing at the syntax and discourse levels in L2 learners.

JASON ROTHMAN (UNIVERSITY OF READING - DISCUSSANT)

Bio: Jason Rothman is Professor of Multilingualism and Clinical Language Sciences at the University of Reading. His research examines language acquisition and processing in children and adult populations, corresponding to first, second and third language acquisition and various instantiations of bilingualism. Jason is part of the University of Reading's Centre for Literacy and Multilingualism. He is also a professor of Linguistics at the University of Tromsø (Norway), an adjunct professor at the University of Ottawa (Canada) and an associate member of the Centre for Linguistics Study at the University of Lisbon in Portugal. He is co-executive editor of the *international journal Linguistic Approaches to Bilingualism*, sits on the editorial boards of several other journals and book series and over 100 journal articles and book chapters on topics related to bilingualism and multilingualism.

ALESSANDRO BENATI (UNIVERSITY OF GREENWICH- CHAIR)

Bio: Alessandro Benati is Professor of Applied Linguistics and Second Language Studies at the University of Greenwich, UK. He is Director of CAROLE (Centre for Applied Research and Outreach in Language Education).

STEFANO RASTELLI (UNIVERSITY OF PAVIA- CHAIR)

Bio: Stefano Rastelli teaches Second Language Acquisition at the Universities of Pavia and Verona, Italy. He is an associate member of CAROLE (Center for Advanced Research and Outreach in Language Education), University of Greenwich. His research focuses on second language acquisition and processing.