

Research seminar in Psycholinguistics 2020-2021

October 12th, 2020

Julien Dirani, PhD Candidate (New York University)

Lexical Access in Naming and Reading: Spatiotemporal Localization of Semantic Facilitation and Interference Using MEG

Abstract: Naming an object involves quick retrieval of a target word from long-term memory. Research using the semantic interference paradigm has shown that objects take longer to name when they are preceded by primes in the same semantic category. This has been interpreted as reflecting either competition during lexical selection or as an interference effect at a later, postlexical level. Since the behavioral finding has been a core argument for the existence of competition during lexical selection in naming, understanding its processing level is important for models of language production. We used MEG to determine the spatiotemporal localization of the interference effect. We also compared its neural signature to the effect of semantic relatedness in reading, in which relatedness is expected to speed up behavioral responses and reduce activity in the left superior temporal cortex at around 200–300 ms. This is exactly what we found. However, in naming, we observed a more complex pattern for our semantically related targets. First, the angular gyrus showed a facilitatory pattern at 300–400 ms, likely reflecting aspects of lexical access. This was followed by a broadly distributed and sustained interference pattern that lasted until articulatory stages. More transient interference effects were also observed at 395–485 ms in the left STG and at ~100–200 ms before articulation in the parietal cortex. Thus, our findings suggest that the semantic interference effect originates from both early and late sources, which may explain its varying localizations in previous literature.

Host: [Eric Ménétré](#)

October 19th, 2020

Dr. Perrine Ferré (University of Montréal)

Neurofunctional correlates of lexico-semantic abilities according to age and life experiences

Abstract: In the context of an aging society, a better understanding of the neurofunctional mechanisms underlying healthy cognition is crucial. Functional connectivity promises to be a useful tool for observing the phenomena at play at the scale of the whole brain. There is yet a lack of studies focusing on skills that remain preserved with age - such as lexical and semantic knowledge - and taking into account both the cognitive context and the life experiences that are known to influence brain function. Such an exploration is required to reach an accurate definition of the neuro-functional patterns underlying healthy cognition in the elderly. Using task-based functional connectivity (FC), the effect of age on functional connectivity was first compared during three lexical-semantic tasks and a resting-state. The results emphasize that the mental state induced by the context of a task generates distinct age-related neurofunctional patterns, in a gradient consistent with the cognitive impression of each acquisition paradigm. In a second study, we manipulated lexical frequency in a classical picture naming task, with the aim to assess the impact of the intrinsic requirement of the task on neurofunctional patterns. Results showed that brain functional architecture differed between age groups, and no evidence of increased reliance on domain general control processes was found during the less frequent -supposedly more difficult- condition. Finally, the direct and indirect links between naming performance, functional connectivity and neurocognitive reserve. Cognitive performance of younger and older adults alike depend mainly on the ability of the PCC (DMN) to disengage during the task, yet through different circuits: older adults tend to rely more on connectivity speech motor regions. Unexpectedly, a mediation effect is observed only in the younger group: brain connectivity patterns carry the indirect relationship between cognitive reserve and task accuracy in younger adults only. The lack of implication of neurocognitive reserve proxies in naming performance may suggest that older adults rely on their lifelong acquired semantic knowledge. This work therefore underlines that task-based FC thus offers a window, distinct from RS, to explore the effect of age on brain organization. Brain mechanisms in older age deserve to be studied in the general perspective of both losses and gains acquired over the course of adult life, which is rarely the case in current neuro-cognitive models of aging.

Host: [Tanja Atanasova](#)

November 16th, 2020

Dr. Gorka Fraga-González (University of Zürich)

Learning new letter-speech sound associations: A computational neuroscience approach

Abstract: A crucial step in alphabetic orthographies is the establishment of letter-speech sound (LSS) associations that will eventually become integrated. It has been suggested that impairments in dyslexic readers may result from a deficit in this process. Yet, it is unclear whether this is primarily an audiovisual integration deficit or more general learning mechanisms are implicated. Neuroimaging studies converge in finding atypical sensitivity of multisensory and visual areas in dyslexia, but a meta-analysis suggested differences in a broader set of brain regions, including some involved in learning and feedback processing. Our project aims at clarifying the role of associative learning in individual differences in reading acquisition. We present an artificial script learning paradigm in which participants use feedback during the task to learn new LSS associations. Using a computational models of decision making and reinforcement learning, we will quantify different processes underlying LSS learning and correlate them with brain activity. Our primary aim is to find new ways of capturing individual differences in learning how to read and improve early identification of reading problems. Our second aim is to refine our neurocognitive models of reading acquisition and LSS binding.

Host: [Tanja Atanasova](#)

November 23rd, 2020

Dr. Silvia Marchesotti (University of Geneva)

Selective enhancement of low-gamma activity by tACS improves phonemic processing and reading accuracy in dyslexia

Abstract: The phonological deficit in dyslexia is associated with altered low-gamma oscillatory function in left auditory cortex, but a causal relationship between oscillatory function and phonemic processing has never been established. After confirming a deficit at 30 Hz with electroencephalography (EEG), we applied 20 minutes of transcranial alternating current stimulation (tACS) to transiently restore this activity in adults with dyslexia.

The intervention significantly improved phonological processing and reading accuracy as measured immediately after tACS. The effect occurred selectively for a 30-Hz stimulation in the dyslexia group. Importantly, we observed that the focal intervention over the left auditory cortex also decreased 30-Hz activity in the right superior temporal cortex, resulting in reinstating a left dominance for the oscillatory response. These findings establish a causal role of neural oscillations in phonological processing and offer solid neurophysiological grounds for a potential correction of low-gamma anomalies and for alleviating the phonological deficit in dyslexia.

Host: [Tanja Atanasova](#)

November 30th, 2020

Prof. Anita van der Merwe (University of Pretoria)

A Four-Level Model of Speech Sensorimotor Control and its Implications for Understanding Motor Speech Disorders

Abstract: The purpose of this presentation is to explain the four-level (FL) model of speech sensorimotor control (Van der Merwe, 1997; 2009; 2020). The FL model is a theoretical framework that proposes four phases in the transformation of linguistic-symbolic symbols to a code that is amenable to a motor system. The model differentiates a phonological planning phase, two pre-motor phases (including motor planning and programming) and a final execution phase. This exposition characterizes the pathophysiology underlying apraxia of speech and other motor speech disorders. The theoretical framework was first published in 1997 and updated in 2009. The latest update published in 2020, provides new perspectives on the speech motor planning and programming phases.

Hosts: [Monica Lancheros](#) & [Marion Bourqui](#)

December 7th, 2020

Dr. Nelly Joye (University College London)

Investigating the spelling errors and strategies of school-aged children with DLD in French and English: what does it tell us about the language they learn and what does it tell us about their language difficulties?

Abstract: Developmental Language disorder (DLD) is a common disorder affecting children's ability to learn to talk and understand. It is present in a range of languages and has long lasting effects on school attainment and well-being. One of the skills which is known to represent particular challenges for children with DLD is spelling. Because it relies on a range of linguistic skills (phonological, morphological and lexical/semantic), spelling might also be a good indicator of children's language profile at school age.

The present study investigates different approaches to exploring the linguistic processes impaired in children with DLD at the end of primary school. It does so in two languages with different linguistic and orthographic characteristics: French and English. Specifically, the spelling errors and strategies of children with DLD were analysed qualitatively, depending on whether they resorted to phonological, orthographic, morphological or semantic difficulties. The spelling errors and strategies in these linguistic categories are contrasted for children with DLD and both age- and spelling-matched typically-developing peers.

The findings are discussed with regards to the information it provides on typical spelling development in both French and English, and on the specific linguistic areas of difficulties of children with DLD. The merits and limitations of such qualitative methods are also discussed.

Host: [Hélène Delage](#)

February 1st, 2021

Prof. Sévrine Casalis (University of Lille)

What is the role of morphological processing in learning to read?

Abstract: After presenting the theoretical basis for attributing an independent role to morphological processing in learning to read, we will present a summary of the work carried out in two areas: the contribution of morphological awareness to reading/writing achievement, and the time processing of morphological units during reading. We will also discuss our experiments on the possibility of these processing to play a compensatory role in reading in relation to impaired skills (phonological for dyslexics, vocabulary for children with delayed language development).

Host: [Estelle Ardanouy](#)

February 15th, 2021

Dr. Mauricio J Martins (Ecole Normale Supérieure Paris)

Recursive Hierarchical Embedding: Cognitive and Neural implementations in the Motor, Musical and Visual domains

Abstract: Complex hierarchical structures occur in language, music and action planning. In these domains, it is difficult to establish the limits of hierarchical depth, especially when external memory resources are available.

Recursive hierarchical embedding (RHE) is probably a key capacity to achieve this power. In this talk, I will summarize the results of our research program aiming at describing the cognitive architecture underlying the representation of RHE. After conducting a series of behavioural and fMRI experiments in the visual, musical and motor domains, we found that, behaviourally, the acquisition of RHE rules seems supported by cognitive resources that are general across domains.

However, when we test well-trained participants in the fMRI, the activity patterns suggest that the processing of RHE is supported by retrieving domain-specific representations. We hypothesize that the neural resources necessary to acquire RHE rules are different from those necessary to utilize them after extensive training. In recent fMRI and brain lesion studies, we tested participants untrained in our tasks and found evidence for shared neural resources in the processing of RHE across domains. Moreover, we found an interesting division of labour between cortical (IFG and pSTS) and subcortical regions (Hippocampus and Basal Ganglia) in the processing of hierarchies.

Host: [Samuel Schmid](#)

February 22nd, 2021

Prof. Peter König (Universität Osnabrück)

Embodied Cognition

Abstract: In cognitive science, experiences are taking a *pragmatic turn*, away from the traditional representation-centered framework, and towards a paradigm that focuses on understanding cognition as *enactive*, i.e., as a skillful activity that involves ongoing interaction with the external world. This requires studying the neurophysiology's substrate of cognition in natural settings. Here, we follow this approach recording EEG and eye-movements under natural conditions and in VR. The results lead to quantitatively and qualitatively new insights, supporting the notion of *enacted cognition*.

Host: [Tanja Atanasova](#)

March 1st, 2021

Maria Kliesch, PhD Candidate (University of Zürich)

Cognition and Electrophysiology in the Aging L2 Learner – Findings from a Dense-Longitudinal Intervention Study

Abstract: Second language (L2) learning in older age has been proposed as a promising avenue for mitigating age-related cognitive decline. While this hypothesis has been around for several years, there have only been few behavioural and even fewer neurophysiological studies investigating the effects of L2 training on cognition and electrophysiology in older learners themselves.

In my talk, I will outline how we have addressed this question in a dense-longitudinal intervention study, in which older adult speakers of (Swiss) German (ages 64-74y) either learned Spanish as a L2, participated in regular strategy games (active control group) or formed part of a passive control group. By collecting electroencephalographic (EEG) measures of the brain at rest both before and after the training as well as weekly cognitive, socio-affective and L2 proficiency measures over the training period of 30 weeks, we aimed to answer the following research questions:

1) What are the cognitive, socio-affective and electrophysiological predictors of successful L2 learning in old adulthood?;

2) How do these predictors affect L2 trajectories over time?;

and 3) Is cognitive performance and/or electrophysiology of the brain at rest affected differently by the L2 training than by the active and passive control conditions?

To answer these questions, I will illustrate, among others, how we have applied Generalized Additive Mixed Models (GAMMs) to behavioural time series and used Minimum Spanning Trees to assess and compare network organization in the brain at rest.

Host: [Tanja Atanasova](#)

March 8th, 2021

Dr. Dirk U. Wulff (University of Basel)

Mapping the Aging Lexicon

Abstract: People undergo many idiosyncratic experiences throughout their lives that may contribute to individual differences in the size and structure of their knowledge representations. Ultimately, these differences may have important implications for individuals' cognitive performance across the lifespan. In this talk, I present our efforts to use network analytic tools to measure the structure of individual and aggregate-level knowledge representations of younger and older adults using different behavioral approaches—verbal fluency, similarity ratings, and free associations—and to link them to people's cognitive performance. Our results reveal systematic differences in key network metrics between people of different age groups and corroborate assumed links between individuals' networks and cognitive performance. Our results also point to critical challenges for future work, which I will discuss along with potential next steps.

Host: [Giulia Kretlow](#)

March 15th, 2021

Dr. Maëva Michon (Pontificia Universidad Católica de Chile)

Multimodal integration of speech perception: the relevance of visual and motor systems

Abstract: During face-to-face interactions, seeing the speakers faces improves our comprehension of speech. In this talk, we will explore the brain mechanisms underlying this facilitation. Using EEG, we showed that visemic salience modulates the generation of cross-modal (visual to auditory) predictions and that motor system, particularly orofacial effectors seem to be involved in those predictions. Integrating evidence from evolutionary and developmental neuroscience, we propose the existence of a trimodal network involving auditory, visual and motor representations of the basic elements of speech: phoneme, visemes (i.e., corresponding mouth movements), and *articulemes* (i.e., articulatory sequences).

Host: [Monica Lancheros](#)

March 29th, 2021

Dr. Simone Sulpizio (Università di Milano-Bicocca)

Decisions in actions: Psychophysiological evidence blurring the boundary between cognition and action

Abstract: According to most prominent (neuro)cognitive models of decision-making, motor-response implementation serially follows decisional processes. However, some evidence from sensory tasks suggests that the decisional process may reach the motor stages. Starting from this observation, in lexical decision experiments using EEG and EMG, we tested whether the process of stimuli evaluation is continuously mapped onto the response channels. Our results show that there is no clear segregation between the linguistic processing of input stimuli (i.e., the written words/pseudowords) and the implementation of the corresponding choice in terms of motor behavior (i.e., right/left button press). These findings challenge the widely shared assumption of a discrete processing distinction between decisional and motor-response processes in the context of binary decisions based on symbolic stimuli.

Host: [Tanja Atanasova](#)

April 19th, 2021

Dr. Pascale Dubois (McGill University)

The school-to-work transition of young adults with DLD – issues and research evidence

Abstract: Young adults with developmental language disorder (DLD) are at risk of facing many challenges during their transition to adulthood in terms of outcomes in education, employment, and independent living. This presentation will first discuss the results of a systematic review on this subject published in the *Journal of Speech, Language, and Hearing Research*. Participants will then be familiarized with self-determination theory, and more precisely with the concepts of autonomy support and motivation. The results of a study in which their role was examined regarding the school-to-work transition status and well-being of youth with DLD will be presented. 37 young adults with DLD participated in a retrospective study and 218 students (52 with DLD) of a vocational program offered in Quebec, Canada participated in a prospective study. Finally, the clinical implications will be discussed.

Host: [Pauline Prat](#)

May 17th, 2021

Dr. Amie Fairs (Aix-Marseille University)

Can we use the internet to study speech production? Yes, we can.

Abstract: The closure of cognitive psychology labs around the world due to the COVID-19 pandemic has prevented in-person testing. This has caused a particular challenge for speech production researchers, as before the pandemic there were no studies demonstrating that reliable overt speech production data could be collected via the internet. From a recent study, I present evidence that both accurate and reliable overt articulation data can be collected from internet-based speech production experiments. We tested 100 participants in a picture naming paradigm, where we manipulated the word and phonotactic frequency of the picture names. We compared our results to a lab-based study which used the same materials and design. We found a significant word frequency effect but no phonotactic frequency effect, fully replicating the lab-based results. Effect sizes were similar between experiments, but with significantly longer latencies in the internet-collected data. We found no evidence that internet upload or download speed affected either naming latencies or errors. In addition, we carried out a permutation-style analysis which recommends a minimum sample size of 40 participants for online production paradigms. In further studies, we have also demonstrated that reliable error data can be collected online using a SLIP task, and reliable and accurate learning can occur using internet-based testing. In sum, these studies demonstrate that internet-based testing of speech production is a feasible and promising endeavour, with less challenges than many researchers (anecdotally) assumed.

Host: [Tanja Atanasova](#)

May 31st, 2021

Prof. Julien Musolino (The State University of New Jersey)

Studying language acquisition during the preschool years: do we need a new paradigm?

Abstract: The preschool years have been a particularly fruitful developmental period for research on language acquisition for two main reasons. The first is that preschoolers are sophisticated language users and can therefore be tested on a range of complex linguistic phenomena of interest to linguists and psycholinguists. The second is that in spite of their linguistic savvy, preschoolers have often been found to differ systematically from adults in their linguistic behavior. Over the past several decades, these observations have led to the emergence of a dominant framework to study language acquisition during the preschool period, accompanied by a wealth of empirical findings. Its historical significance and usefulness notwithstanding, there are strong signs today that this framework needs to be fundamentally revised. In this presentation, I will introduce the standard framework, showcase some of its main applications, and discuss its limitations and the need for a new paradigm.

Host: [Julie Franck](#)

June 14th, 2021

Dr. Svetlana Pinet (BCBL, San Sebastian)

Speech production through speaking and typing

Abstract: While language production is mostly studied through speaking, a huge proportion of our daily production is actually written (texts, emails, etc.). In this talk, we will explore speech production through two modalities, speaking and typing. First, I will present evidence that typing and speaking do share some of their underlying cognitive architecture, allowing for the comparison between them, and will discuss some methodological aspects that are important to consider when studying typing. Second, I will present evidence regarding how modalities might interact during word learning. Ultimately, I hope to provide you tools and ideas to go beyond spoken language production.

Host: [Grégoire Python](#)