JOURNEE SCIENTIFIQUE ISCT

Jeudi 26 Février 2015
à Toulouse

Institut des Sciences du Cerveau de Toulouse
Pavillon Baudot, CHU Purpan
(Salle de conférence – 1er étage)

8h45 - 9h15	**Welcome / coffee**
9h15 - 9h30	**François Chollet** - Introduction
9h30 -10h30	**Gabriella Vigliocco** **(Language and Cognition Lab, UCL, London)** Language, multimodality and iconicity
10h30 -11h30	**Patrick Cavanagh (Université Paris Descartes)** Where : predictive position coding across the senses
11h30 – 12h00	**Coffee break**
12h00 -13h00	**Jean François Démonet (CHUV, Lausanne University)** L'imagerie cérébrale du langage: d'un siècle à l'autre
13h00 - 14h00	**Lunch**
14h00 - 15h00	**François Féron (NICN, Aix Marseille University)** The nose, an overlooked tool for understanding and repairing the brain
15h00 - 16h00	**John Jeka (Temple University Philadelphia)** Being Human: Under-Actuated and Over-Sensed
16h00	**Yves Trotter** - Conclusion

UNIVERSITE DE TOULOUSE LE MIRAIL
UNIVERSITÉ TOULOUSE III PAUL SABATIER
CNRS
Inserm Institut national de la santé et de la recherche médicale
Hôpitaux de Toulouse

Gabriella Vigliocco *(Language and Cognition lab. UCL, London)*

Language, multimodality and iconicity

Iconicity, a resemblance between properties of linguistic form (both in spoken and signed languages) and meaning, has traditionally been considered to be a marginal, irrelevant phenomenon for our understanding of language processing, development, and evolution. Rather, the arbitrary and symbolic nature of language has long been taken as a design feature of the human linguistic system. In the talk, I will propose an alternative framework in which iconicity in face-to-face communication (spoken and signed) is a powerful vehicle for bridging between language and human sensori- motor experience, and, as such, iconicity provides a key to understanding language development, and processing. In development, iconicity might play a critical role in supporting referentiality (learning to map linguistic labels to objects, events etc. in the world), which is core to vocabulary development. In language processing, iconicity could provide a mechanism to account for how language comes to be embodied (grounded in our sensory and motor systems), which is core to meaningful communication.

Patrick Cavanagh (Université Paris Descartes)

Where: predictive position coding across the senses

How do we know where things are? We most often focus on how the brain encodes and recognizes *what* an object is, but the underlying code for *where* it is offers promising insights into functional architecture. In particular, an object's location appears to be a construction on a high-level "map", strongly influenced by the object's current motion and by our upcoming eye, head, and body movements. This map appears to be supramodal, keeping track of location from several modalities. The predictive corrections for motion have similarities to several other high level processes that use context to recover world properties, e. g., recovering surface color by discounting the illuminant or intentions by discounting the situation. For the coding of position, locations can be updated predictively to represent where targets are expected next, even before they get there.

Jean François Démonet *(CHUV, Lausanne University)*

L'imagerie cérébrale du langage: d'un siècle à l'autre

L'imagerie cérébrale a transformé en un quart de siècle nos conceptions des rapports entre la structure cérébrale et les processus mentaux. Le langage offre un exemple spectaculaire de cette substantification de l'esprit. A la fois une confirmation des notions de base de l'aphasiologie établies un siècle auparavant et panorama toujours plus complexe du détail de la physiologie de certaines fonctions, la somme des recherches menées dans ce domaine permet de générer de très nombreuses questions. Certaines conduisent à aborder des aspects fondamentaux du codage neuronal impliqué dans le comportement émergent qu'est le langage. D'autres permettent de mieux explorer les substrats cérébraux de la récupération de l'aphasie.

François Féron *(NICN, Aix Marseille University)*

The nose, an overlooked tool for understanding and repairing the brain

The olfactory mucosa, located in the nasal cavity, is the only nervous tissue that is 1) easily accessible in every living individual, 2) permanently renewed, 3) home of at least two types of stem cells and 4) a straight route to the brain, allowing certain molecules to bypass the blood brain barrier. During the recent years, we focused our attention on the stem cells located in the lamina propria and demonstrated that they display a phenotype similar to bone marrow mesenchymal stem cells. However, they display unique characteristics that make them attractive when the diagnosis or the repair of the pathological brain is considered.

In line with previous studies highlighting the therapeutic potential of these cells in animal models of paraplegia, Parkinson's disease and hearing loss, we transplanted human nasal olfactory stem cells in a mouse model of excitotoxically-induced loss of memory. Four weeks after grafting, a robust exogenous neurogenesis, associated to long term potentiation (LTP) recovery, allowed the mice to retrieve most of their associative memory. Noticeably, a similar result was obtained when stem cells were grafted into the cerebrospinal fluid of lesioned mice.

In parallel, we set up a bank of human nasal olfactory stem cells collected from 11 adult autistic patients and 11 age- and gender-matched healthy individuals. A pangenomic microarray study revealed a new candidate gene (*MOCOS*) involved in purine metabolism. We found that *MOCOS* invalidation induces an exacerbated stress response and an altered synaptogenesis.

John Jeka *(Temple University Philadelphia)*

Being Human: Under-Actuated and Over-Sensed

The evolutionary development of bipedal stance, which freed the hands from locomotion, is considered the fundamental distinction between humans and our closest relatives. Accompanying that development is the problem of stability. Engineered devices, such as cars and robots, solve the stability problem by having a wide base of support and/or concentrating the bulk of its weight lower down. However, the human body has evolved with more than just upright stability as a constraint, with its mass concentrated higher up in the trunk, making it inherently unstable and prone to falls. This "mechanically unstable" design has been matched with a sophisticated control system to maintain upright stance during functional behavior (e.g., tool-use), lending itself to many fundamental questions about how the nervous system solves this complex control problem. Moreover, the neural and biomechanical subsystems that enable standing are subject to injury and dysfunction, leading to many disease populations with limited options based upon current medical treatments. My research group aims to bridge the basic and applied science underlying balance control. Combined with techniques that precisely manipulate input from visual, vestibular and proprioceptive sensory systems, postural control mechanisms are studied with particular regard for the processes involved in fusing information from different sensory systems to provide an overall estimate of body dynamics. Computational methods combine mechanisms of multisensory fusion with biomechanical investigations of multilink body dynamics to develop realistic models of human postural control. The combination of experimental studies with computational models is then applied to the development of new techniques and assistive devices for treatment of patient populations with balance disorders including individuals with the loss of inner ear (vestibular) function, fall-prone older adults and Traumatic Brain Injury (TBI).