

## Lille-Naples Master Research projects

### **Pr. Coello & Pr. Ruggiero**

#### **Peripersonal space perception and emotional stimuli**

This study will test in virtual reality the link between the emotional content of visual stimuli and the distance at which we feel comfortable with these stimuli. The aim of the research project is to find the rule the brain use to determine a safe distance with object or individual depending on the threat they suggest.

#### **Action consequence and peripersonal space in virtual reality**

We have demonstrated that the positive/negative consequences of acting on objects modifies the representation of peripersonal space. This modification is also obtain when we observe someone acting on objects with positive/negative consequences. The project will consist in developing a virtual reality version of the test using avatars as social context. Different avatars (attractive, non-attractive) will be used to evaluate the effect of avatar-valence on their influence on peripersonal space representation.

### **Pr. Angela Bartolo & Pr. Tina Iachini**

#### **Mental imagery and neuropsychology**

Although actual tool use and pantomime production are known to share similar neural mechanisms, patients with limb apraxia have more difficulties with pantomimes than with object use. A possible explanation can be related to the role of mental imagery in that it might be more prominent during the production of pantomimes than in the object use. In this study, the type of mental imagery (visuo-spatial, motor, or visuo-motor imagery) that intervenes in the production of pantomimes will be investigated. Furthermore, objects used toward the body (e.g. a comb) have been found to be more sensitive to errors than objects used far from the body (e.g. hammer). In summary, this study will try to understand whether different cognitive strategies intervene:

- 1) During pantomime production with respect to object use
- 2) According to the final destination of the object used (toward or far from the body).

A group of 28 healthy adults will be tested by means of the Qualysis system to achieve the kinematic parameters of the movements. Mental rotation tasks will be run on E-Prime. The experimental protocol has been already approved by the Ethical Committee of the University of Lille. Some preliminary data have been already collected.

Students will acquire skills on the use of a system to collect kinematic data as well as to the run and interpret data analyses.

### **Pr. Yann Coello & Pr. Gabriela Santangelo**

#### **Language and neuropsychology**

Different projects in neuropsychology will be developed involving Parkinson patients to study the relation between action representation and language, the relation between action representation and perception of social intention, the relation between action representation and mental imagery

## Lille-Minho Research project

**Pr. Joana Coutinho and Pr. Yann Coello**

### **Spatial and social cognition**

The representation of near action space depends on both the representation of action possibilities with the body, and the expected consequences (rewards) of acting on objects. The emotional content of objects is thus central in the representation of near action space and will be studied by modifying the probability of reward expectation when acting on objects in an individual context (consequence of self-actions) or a social context (consequence of self- and others-actions).

**Pr. Séverine Casalis & Pr. Montserrat Comesana**

### **The mysteries of the bilingual brain**

Recent studies have showed that during second language (L2) word recognition there is a fast morphological decomposition which is modulated by cross-linguistic similarities of morphemic constituents (Comesaña et al., 2017). For instance, when Portuguese-English bilinguals encounter the English word “racism”, this is quickly decomposed into its constituents (race + -ism) and also quickly translated in Portuguese (racismo [raça + -ismo]). The processing of L2 suffixes that share form across-languages are privileged in comparison with suffixes that do not share form (e.g., -ly and -mente in rarely and raramente). The aim of the present research is to further examine this issue by manipulating the status of suffixes (bound suffixes like -ment vs. free suffixes like -age). For that purpose a masked priming lexical decision task in English will be used with different populations of unbalanced bilinguals (Portuguese-English and/or French-English) and a control group of English native speakers.

### **Is grammatical gender activated during the production of French bare nouns?**

The representation and retrieval of grammatical gender in the lexicon during the processing of bare nouns are controversial issues in the literature. Indeed, some recent studies in Romance languages using the picture-word interference paradigm (i.e., participants must name the image presented to them on the screen as soon as possible using a bare noun while ignoring a distracting word) have found a gender-incongruent effect (i.e., participants' response times decrease when the gender of the noun that designates the image does not coincide with the genre of the distractor noun). However, other studies have failed to find such an effect in these languages and in other non-Romance languages. The objective of the present work is to contribute to this line of research by studying the processing of gender in native speakers of French.

**Pr. Adriana Sampaio & Pr. Angela Bartolo**

### **Neural basis of pantomimes and intransitive gestures: an fMRI study (2 thesis)**

In a couple of studies, selective deficit in the production of intransitive (communicative) gestures with respect to object-related actions (e.g. pantomime of object use) have been found (Stieglitz Ham et al., 2010; Stamenova et al., 2010). In particular, this pattern has been observed in an individual with autism (Stieglitz Ham et al., 2010) as well as in four patients with right brain damage (Stamenova et al., 2010). We supposed that the lack of similar cases in patients with difficulties in gesture processing (limb apraxia) may be related to the fact that limb apraxia is typically tested in patients with left brain damage

(Bartolo & Stieglitz Ham, 2016). Furthermore, as the right hemisphere is considered the “social brain” and individuals with autism are known to have social cognitive deficits (Happé et al., 1999), the selective deficit in the production of intransitive gestures could be related to deficits in social cognition. However, to date, studies on the neural correlates of gestures, although conflicting, share the idea that both pantomimes and intransitive gestures are left-lateralized (Bohlhalter et al., 2008; Kroliczak et al., 2009; Wamain et al., 2014; Balconi et al., 2015). One possible explanation might be related to the information delivered to observers by the intransitive gestures. In an fMRI study, Gallagher and Frith (2004) distinguished between instrumental and expressive gestures. The former are gestures performed to change the behavior of others (e.g., “come here”), the latter are gestures that indicate a mental state (e.g., “I am cold”). Results showed that instrumental gestures elicited activity in the left inferior frontal cortex (BA44), a region related to language processing; whereas the perception of expressive gestures elicited activity in the right superior temporal sulcus, a region known to play a role in theory of mind. Pantomimes are also distinguished into distal and proximal gestures. Distal gestures are performed far from the body (e.g. hammering) whereas proximal gestures are performed toward the body (e.g. combing). It has been proposed that these gestures are differently represented in the brain (see for a review Bartolo & Stieglitz Ham, 2016). The aim of the present fMRI study is to investigate the neural correlates of pantomimes and intransitive gestures by distinguishing instrumental from mental state intransitive gestures as well as distal from proximal pantomime gestures.

Videos are already available; in Lille the Erasmus student will prepare the clips of each video-stimulus and the experimental paradigm in collaboration with Dr. Angela Bartolo (1<sup>st</sup> semester). Data collection (15 participants) and data analyses will be carried out at the University of Minho in collaboration with Pr. Adriana Sampaio (2<sup>nd</sup> semester).

**Pr. Jorge Santos, Alfredo Pereira and Pr. Yann Coello**

### **Spatial and social cognition**

Biological motion (BM) perception – our capacity to extract meaningful information from motion generated by biological agents – has been implicated as a precursor of social development in infancy. The aim of the project is to test biological motion preferences of children using virtual avatars of mothers.