

# Research Statement

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My scientific interests are primarily in the area of clinical linguistics and Natural Language Processing (NLP). A common thread in my research is the application of computational and statistical techniques to describe how the brain processes language, focusing on constants and factors that enables humans to comprehend and produce linguistic signs.

## Summary of previous and ongoing work

### Pragmatics/phonology interface

My MA dissertation focused on the comparison between contextual and perceptual evidence of Information Structure phenomena (IS) inside utterances and the automatic measurement of acoustic prominence. In collaboration with Edoardo Lombardi Vallauri and Fabio Tamburini, I proposed a structural hypothesis on the marking of IS: main prominence can be conceived of in a "topological" way, where its location affects demarcation between different units, rather than their identification and culmination [Gagliardi *et al.*, 2012].

### Semantics/pragmatics interface

I was part of LABLITA team during the building of the IMAGACT Ontology [Moneglia *et al.*, 2012], a repository of action verbs organised around prototypical action scenes in the form of 3D animations. I have been deeply involved with various aspects of the project: annotation and setting up of the ontology [Frontini *et al.*, 2012], linking of the IMAGACT action inventory to various lexical resources [Moneglia *et al.*, 2012], definition of theoretical criteria for linguistic mapping [Gagliardi, 2014b], application of the infrastructure for second language acquisition [Moneglia *et al.*, 2013], comparative analysis of the verbal lexicon in Spanish language varieties [Brown *et al.*, 2014], statistical validation of the semantic categorization [Gagliardi, 2014c].

### Psychometrics

In my PhD research, I created a neuropsychological battery (called "SMAAV: Semantic Memory Assessment on Action Verbs") for assessing the lexical retrieval skills and conceptual knowledge deterioration exploiting the semantic properties of action verbs [Gagliardi, 2014a]. The standard setting has currently involved 95 subjects, according to a cross-sectional study design. Cut-off

score has been determined, and some statistically significant trends have been found. SMAAV may be used for the early diagnosis of Mild Cognitive Impairment (MCI) and the neuropsychological evaluation of acute stroke and traumatic brain injury patients [Corsi & Gagliardi, 2016; Corsi, Gagliardi & Gregori, *in press*].

I'm also coordinating a multidisciplinary team in the validation of a novel elicited production test for clitics pronouns, the main clinical marker of Developmental Language Disorder in Italian [Fancelli, Crocetti, Colpizzi, Borgogni & Gagliardi, *in preparation*].

### **Automatic identification of MCI**

Individuals with preclinical dementia manifest alterations in various cognitive domains: many studies have demonstrated that linguistic features could act as a prodromic marker of cognitive decline. Inside the OPLON project (Opportunities for active and healthy LONGevity, Italian Minister for Instruction, University and Research - MIUR), I worked to build methods to ecologically and inexpensively identify cognitive frailty at very early stage by processing spontaneous language productions of Italian speakers [Calzà, *et al.*, 2015; Beltrami *et al.*, 2016; 2018].

### **Atypical development of language in children**

I am interested in how language interact with other cognitive functions (e.g. motor control and executive functions) across different types of developmental disorder, including Autism Spectrum Disorder (ASD), Social (pragmatic) Communication Disorder and Developmental Language Disorder (DLD). My research on the topic is currently focusing on gestural, pragmatic and narrative aspects of speech productions in preschool children [Beraldi, Gagliardi & Innocenti, *in preparation*].

### **Doctor-Patient Communication**

Effective doctor-patient communication is a key issue in building a therapeutic alliance, and it is crucial in the delivery of high-quality health care. The IMAGACT-MED project ("E-health communication systems for Instructing and Monitoring patients", Regione Toscana) aimed to develop an e-health module exploiting the semiotic property of 3D animation in giving and monitoring clinical instructions. I worked on the creation of a "scripting grammar" for the translation of linguistic instructions into visual information: pilot-studies focused on neonatal clinical practice (routine care of the newborn, discharge and follow-up; low birth weight and prematurity management) and neurodevelopmental disorders.

## Distributional semantics

Large scale technologies are unable to distinguish between general relations of co-occurrence and semantic relations among words in a text: as a matter of fact, traditional keyword-based search engines retrieve information by matching the exact textual input of the user query with the tokens in the documents.

In collaboration with Fabio Tamburini, I am trying to develop a "semantic search engine" for the extraction of linguistic information from textual objects by exploiting Distributional Semantic Models, in order to enhance text mining and retrieval results.

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