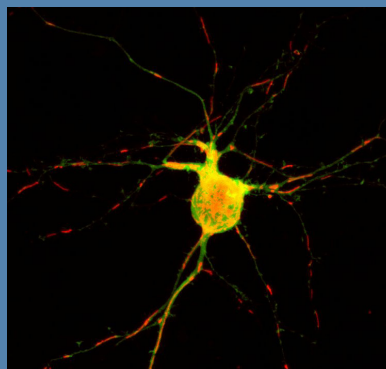
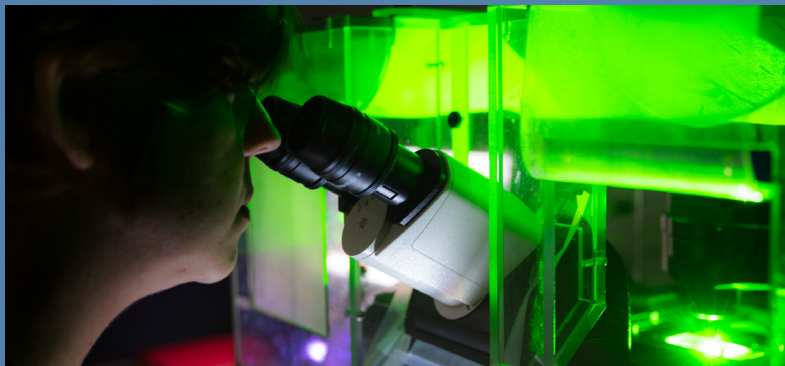




Institut de Neurociències
UNIVERSITAT DE BARCELONA

Knowledge transference



Knowledge Transference at the Institute of Neurosciences

“From research
to society”



UNIVERSITAT DE
BARCELONA



Institut de Neurociències



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UNIVERSITAT DE BARCELONA

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of Barcelona**

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Neurosciences

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The Institute of Neurosciences of the University of Barcelona

The Institute of Neurosciences of the University of Barcelona gathers researchers aiming to understand the central nervous system in all the analysis levels, from the biology of the neuron, through the formation of neural circuits, to the global function of the brain, which is the basis of cognition and behaviour. The Institute of Neurosciences was constituted in 2015, in order to highlight the research in neurosciences by the University of Barcelona, and to boost synergies between disciplines which traditionally have been separated. The Institute joins about 300 members from the Faculties of Psychology, Medicine, Biology and Pharmacy.

The Institute of Neurosciences aims to be a national and international reference in neurosciences research, because of the quality of its research activity and the international projection of its researchers, but also because it includes all the main research branches of modern neurosciences. Furthermore, in our Institute we aim to promote an inclusive and efficient research model, aligned with societal challenges and based on principles of Responsible Research and Innovation.

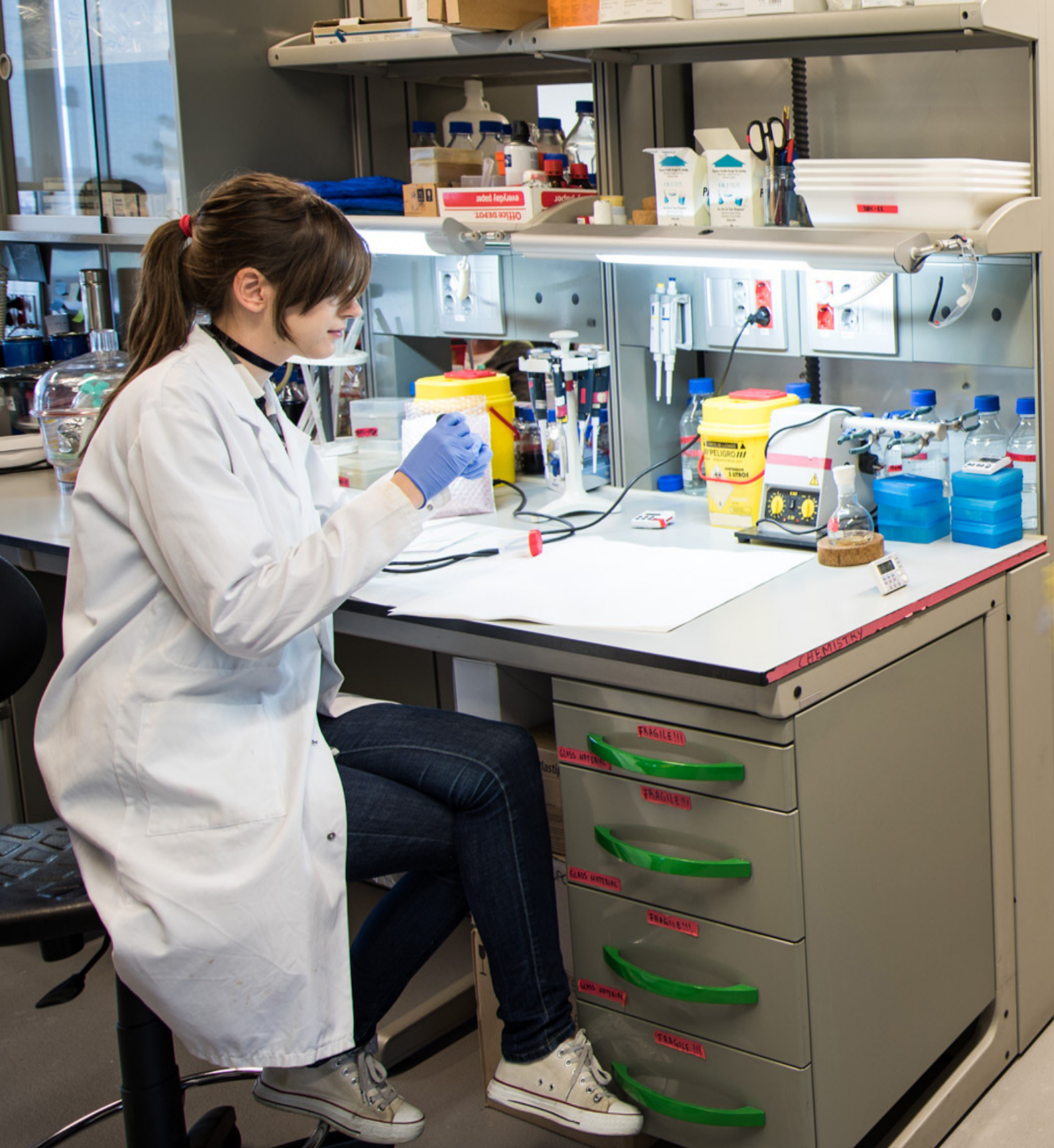
Research is organized in six scientific areas:

1. **Neurobiology and Neuropharmacology**
2. **Physiopathology of Nervous System Diseases**
3. **Cognitive Neuroscience and Neuropsychology**
4. **Cognition, Behavior and Computation**
5. **Clinical and Applied Psychology**
6. **Neurology and Psychiatry**

Areas of expertise:

Biomedicine and neurology
page 8

Cognitive neuroscience and psychology
page 20



Biomedicine and neurology

Genetics and genomics of neurodegenerative diseases

Contact

José M. Vidal Taboada
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Research line

• Identification of new genetic biomarkers and therapeutic targets for Amiotrophic Lateral Sclerosis (ALS), Parkinson and Alzheimer's diseases, using next generation sequencing and RNAseq. Characterization of pharmacogenetics biomarkers in the response and safety of treatments for neurodegenerative diseases.

Keywords

Genetics
Pharmacogenetics
ALS
Alzheimer
RNA-seq
Next generation sequencing

Capacities

Disease / disorder characterization	Genomic characterization of patients samples by microarray and RNAseq technologies
Treatment discovery	Pharmacogenetics for response and safety of treatments
Methods for diagnostic	Genetic and genomic analysis
Clinical data	DNA samples and clinical data for ALS, Parkinson and Alzheimer disease
Development of new tools / technologies / methods	Biochemical and imaging secretion assays

Neural and endocrine secretory pathways in normal and pathological conditions

Contact

Fernando Aguado
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Research line

• Studies on biogenesis, trafficking and exocytosis of secretory organelles and excitation-secretion coupling.
• Identification of alteration of secretory processes in neural and endocrine cells in human diseases.
• Identification of new brain biomarkers for human diseases.

Keywords

Secretion
Alzheimer
Calcium
Cerebrospinal fluid
Exocytosis
Biomarker

Capacities

Disease / disorder characterization	Cellular and molecular alterations
Assessment of new treatments	Animal models
Methods for diagnostic	Brain and cerebrospinal fluid analysis in mice and humans
In vitro models	Primary cultures and cell lines
In vivo models	Normal and genetically modified mice
Development of new tools / technologies / methods	Biochemical and imaging secretion assays

Parkinson's disease and movement disorders

Research line

• Senior specialist neurologist and clinical researcher at the Parkinson's disease and movement disorders unit of the Hospital Clínic de Barcelona; lecturer in Physiology of the Nervous System at the School of Medicine of the University of Barcelona; international PhD degree with commendations; over 50 papers in international peer-reviewed journals.

Contact

Yaroslau Compta Hirnyj
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Capacities

Disease / disorder characterization	Endophenotypification studies
Assessment of new treatments	Clinical trials, non-dopa agents
Methods for diagnostic	Cerebrospinal fluid (CSF) and imaging biomarkers
Clinical data	Collaborative clinical registries
Development of new tools / technologies / methods	Implement new CSF and PET markers
Others	Health economics

Keywords

Parkinson
Biomarkers
Atypical Parkinsonism
Cerebrospinal fluid (CSF)
Neuropathology
Neuroimaging

Ageing and Alzheimer Disease

Research line

• Identification of new therapeutic targets for Alzheimer's disease.

Contact

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Capacities

Disease / disorder characterization
Treatment discovery
<i>In vitro</i> models
<i>In vivo</i> models

Keywords

Alzheimer
DKK1
SAMP8
Beta-catenin
Wnt pathway

Molecular mechanisms of neuroinflammation in neurodegenerative diseases

Contact

Nicole Mahy
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Research line

- Identification of pathophysiological processes present in neurological disorders such as stroke, Alzheimer's disease or amyotrophic lateral sclerosis (ALS).
- Molecular and cellular mechanisms of neuroinflammation in neurodegenerative diseases.
- Identification of new therapeutic targets for ALS.

Keywords

Neuroinflammation
Translational research
Neurodegeneration
Neuroprotection
Drug discovery
Animal models

Capacities

Disease / disorder characterization	ALS, Alzheimer's disease
Treatment discovery	Animal models and cell cultures
Assessment of new treatments	Animal models and cell cultures
In vitro models	Glial & neuronal primary cultures and cell lines
In vivo models	ALS transgenic mice, stereotaxic injection
Others	Massive sequence analysis

Huntington's disease: pathological mechanisms involved in cognitive and psychiatric symptoms

Contact

Sílvia Ginés Padrós
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Research line

- Identification of new pharmacological targets to ameliorate or prevent the most important clinical hallmarks in HD: Motor, cognitive and emotional disturbances.

Keywords

Synaptic plasticity deficits
Neuroprotection
Memory impariments
Depression
p75/TrB/BDNF
Cdk5

Capacities

Disease / disorder characterization	Behaviour (motor, cognition, emotional) In vivo and in vitro analysis of cell death, biochemical parameters, synaptic function, behaviour
Assessment of new treatments	
In vitro models	Neuronal striatal cell lines
In vivo models	Huntington's disease mouse models

Physiopathology and toxicology of sensory and motor systems

Research line

- Evaluation of the vestibular system in animal models: behavioural evaluation of vestibular dysfunction, analysis of vestibular system histopathology, identification of molecular targets in the vestibular periphery, vestibular toxicology and pharmacology.
- Animal models of sensory toxicity: auditory, visual, olfactory, dorsal root ganglia.
- Neurotoxicity assessment in animal models.

Capacities

Disease / disorder characterization	Equilibrium disorders (animal models)
Treatment discovery	New molecular targets in inner ear
Assessment of new treatments	Drug testing in vertigo/disequilibrium models
<i>In vivo</i> models	Ototoxicity, neurotoxicity
Development of new tools / technologies / methods	High speed video for equilibrium disorders in animals
Others	State-of-the-art evaluation of vestibular epithelium

Contact

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Keywords

Ototoxicity
Vestibular system
Sensory toxicity
Neurotoxicity
Animal

Neuropharmacology and Pain

Research line

- Adenosine and dopamine receptor-receptor interactions in the neurobiology of schizophrenia & Parkinson's disease. Adenosine receptors as new targets for the treatment of atrial fibrillation.
- GPCRs & ion channels oligomerization. GPCR Optopharmacology. The Parkinson's disease-associated GPR37 receptor: a promising target for neurological diseases.
- Targeting the sigma-1 receptor: Pain and more.
- Phosphorylation of NMDAR in Down syndrome and AD. NMDAR mutations and intellectual disability.
- The Gut Microbiome in Neuroinflammation and Neurodevelopmental Disorders

Capacities

Disease / disorder characterization	Parkinson's and Alzheimer's disease, Pain...
Treatment discovery	Drug design and validation
Assessment of new treatments	Preclinical research (i.e. animal models)
Methods for diagnostic	Design and development of biosensors
<i>In vitro</i> models	Cell-based disease models
<i>In vivo</i> models	Pharmacological and genetics animal models
Clinical data	In collaboration with Bellvitge's Hospital
Development of new tools / technologies / methods	Fluorescence/Bioluminescence-based biosensors

Contact

Francisco Ciruela
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Keywords

GPCR
Pain
Neurological disorders
Neuropharmacology
Neuropsychiatric disorders

Mechanisms of neuronal hyperexcitability and chronic pain

Contact

Xavier Gasull Casanova
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Research line

- Pathophysiological mechanisms of pain in sensory neurons
- Electrophysiological techniques for ion channel analysis. Drug effects targeting ion channels
- Identification of new therapeutic targets for acute and chronic pain and itch
- Behavioural animal models of pain/itch
- Ion channels and membrane receptors in ocular tissues involved in glaucoma and ocular hypertension pathophysiology.

Keywords

Ion channels
Electrophysiological techs.
Pain / itch
Ocular hypertension
Glaucoma
Sensory neurons

Capacities

Disease / disorder characterization	Acute and chronic pain and itch
Treatment discovery	New molecular targets involving ion channels
Assessment of new treatments	Ion channel modulators/blockers/activators
In vitro models	Cellular models, neuronal cultures
In vivo models	Animal models of pain and itch. Ocular models of pathology

Glutamatergic receptors in synaptic transmission

Contact

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Research line

- Characterization and identification of interacting proteins regulating AMPA receptor function.
- Studies of synaptic plasticity (long term potentiation and depression).
- Characterization of newly synthesized therapeutic compounds on NMDA receptors.
- Functional studies on glutamate receptor mutations related to intellectual disabilities.

Keywords

Electrophysiology
Ionotropic Glu receptors
Hippocampal pyramidal neurons
Long term plasticity
Single channel conductance

Capacities

Disease / disorder characterization	Electrophysiological characterization of glutamate ion channels dysfunction
Assessment of new treatments	Ion channel blockers and positive allosteric modulators
In vitro models	Cell lines, neuronal cultures, hippocampal slices
Others	Electrophysiology in several recording configurations

Eye's physiology and Pathophysiology of Glaucoma

Research line

- Identification and characterization of membrane ion channels involved in trabecular meshwork function and intraocular pressure regulation.

Contact

Núria Comes Beltran
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Capacities

Disease / disorder characterization	Ocular diseases, glaucoma
In vitro models	In vitro cellular models of glaucoma
In vivo models	KO mice, In vivo models of glaucoma in mice and rats, Intracameral injection of viruses to inhibit gene expression in mice and rats
Others	Molecular biology, cellular biology, biochemistry and electrophysiology

Keywords

Ion channels
VRAC
Glaucoma
Intraocular pressure
Trabecular meshwork
Neurodegenerative diseases

Electromyography. Motor Control Neuropathic Pain

Research line

The studies run in our group involve the evaluation of motor and sensory physiology in human subjects, both healthy subjects and patients, using non-invasive methods:

- Studies of reflex excitability in human subjects.
- Modulation of brain activity by cortical magnetic stimulation.
- Evaluation of sensory perception.

Contact

Josep Valls Sole
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Capacities

Disease / disorder characterization	Pathophysiological diagnoses
Methods for diagnostic	Non-invasive brain stimulation
Clinical data	Motor and sensory nerves and pathways
Development of new tools / technologies / methods	Excitability studies

Keywords

Electromyography
Nerve conduction
Reflex excitability
Motor control
Neuropathic pain
Sensory perception



**Cognitive neuroscience and
psychology**

Mental health and eye tracking technology

Contact

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Research line

• Diagnosis of mental pathologies such as ADHD, Autism, Dyslexia by novel eye tracking technologies.

Keywords

Biomarker
Cognition
Diagnosis
Mental disease
Screening
Eye tracking

Capacities

Disease / disorder characterization	Diagnosis
Treatment discovery	Treatment of mental disease
Methods for diagnostic	ADHD in children and adults
Development of new tools / technologies / methods	Novel patented eye tracking technology
Others	Neuromarketing applications and car safety

Cognitive Neuroscience of Audition

Contact

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Research line

We measure how the brain reacts to sound, and how sounds drive auditory perception, attention, and emotions. This includes the sounds of music, the sounds of language and the sounds of the environment.

By measuring the brain encoding of sounds, we address basic brain mechanism of cognition that appear dysfunctional in various developmental (e.g., autism), neurological and psychiatric diseases. Our measures test how new treatments (chemical, behavioural), devices or training can cure disease and fit cognitive and brain function.

Keywords

Brain fitness & brain training
Cognitive mechanisms
EEG
Voice recording
Signal analysis
Evoked potentials

Capacities

Disease / disorder characterization	We can identify and measure specific brain mechanisms of cognitive function that defective in specific clinical conditions (e.g., autism, dyslexia, etc.)
Treatment discovery	We can develop methods of auditory discrimination training that can improve cognition
Methods for diagnostic	Electroencephalography (EEG), Evoked potentials, Brain oscillations, digital voice recording and analysis
Development of new tools / technologies / methods	Signal analysis tools for EEG and evoked potentials; Training protocols

Numerical cognition

Research line

We have developed MATHMAGIC, which is a “vaccine” against mathematics phobia. MathMagic is destined to children (2-7 years old) for teaching them the numerical system and pre-operational notions. As well as an introduction to spatial geometry, connecting spatial dimensions (width, height and depth) to the different orders of magnitude (the “ones place”, “tens place”, “hundreds place”, “thousands place”). MathMagic has a three-fold function: 1) It is capable to represent quantities either graphically or by figures; 2) It can transform two operands in a result, based on action commands (using action verbs); and, 3), It can introduce to Geometry, making it easy to understand the n-dimensionality of space.

Capacities

Disease / disorder characterization	Math difficulties, mathematics phobia and anxiety, dyscalculia
Treatment discovery	Enhance cognitive skills and self-confidence
Assessment of new treatments	Mathematical tests
Methods for diagnostic	Mathematical tests
Clinical data	Data about the failure in mathematics. The PISA report
Development of new tools / technologies / methods	A device in which the game is implemented. Software for smartphones

Contact

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Keywords

Numerical cognition
Gamification
e-learning
Playful mathematics
Teaching mathematics
Enhance cognitive skills

Research Group on Measurement Invariance and Analysis of Change - GEIMAC

Research line

Our team has expertise in several methodological approaches applicable to many research fields. Shortly:

- Psychometrics: to develop or adapt psychological instruments and analyse their psychometric properties
- Survey studies: to design a survey study and analyse data

Capacities

Development of new tools / technologies / methods	Development and adaptation of tests, surveys...
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Contact

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Keywords

Development of tests
Psychometrics
Adaptation of tests
Survey studies

Quantitative and computational neuroscience

Contact

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Research line

- Statistical models to represent functional and effective connectivity networks with fMRI data. Use of Multivariate Statistical Techniques in psychological research and psychometric approach to psychological measurement..

Keywords

Computational neuroscience
Functional connectivity
Structural equation models
Effective connectivity
Psychometric analysis
fMRI data

Capacities

Assessment of new treatments	Clinical signification
Clinical data	Statistical techniques
Development of new tools / technologies / methods	Computational neuroscience

Direct and indirect systematic observation

Contact

M. Teresa Anguera
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Research line

- Quantitating qualitative data from observational records (video) and texts (or MPS files)
- Detection of patterns of behaviour and T-patterns from matrix codes (direct and indirect observation)
- Vectorializing human behaviour in order to draw a map of association relations from a systematic observation
- Applying these analysis to several fields (sport, clinical psychology, mediation in conflicts, etc.)

Keywords

Direct observation
Indirect observation
Patterns of behaviour
T-patterns analysis
Polar coordinates analysis

Capacities

Assessment of new treatments	Assessment through the detection of patterns in successive steps of the treatment
In vivo models	Study of human and animal behaviour
Clinical data	Narrative texts and recorded perceptible behaviour
Development of new tools / technologies / methods	Developed in our research group

Speech perception and language learning in infancy

Research line

- Early speech perception and language abilities that are related to later language outcomes.
- Identification of infants at risk for developmental language and cognitive deficits

Contact

Laura Bosch
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Capacities

Disease / disorder characterization	Developmental delays in language learning
Clinical data	Risk populations for neurocognitive deficits

Keywords

Phonetic discrimination
Speech segmentation
Word learning

Neurodevelopmental disorders: autism spectrum disorders and cerebral palsy

Research line

- Cognitive performance and neuroimaging in autism spectrum disorders and cerebral palsy
- Early signs and diagnosis of Autism Spectrum Disorders
- Design and evaluation of therapeutic interventions in Autism Spectrum Disorders

Contact

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Capacities

Disease / disorder characterization	Early signs of ASD, cognitive profile
Treatment discovery	New treatments
Assessment of new treatments	Imitation-based treatment in ASD, pet-assisted interventions, parenting...
Methods for diagnostic	Neuropsychological tests
Clinical data	Children
Development of new tools / technologies / methods	Neuropsychological tests

Keywords

Autism Spectrum Disorders
Neuroimaging
Cognitive performance
Early signs
Cerebral palsy
Therapy

Developmental victimology

Contact

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Research line

- Assessment of child victimization and effects on mental health.

Keywords

Victimization
Polyvictimization
Children
Psychopathology
Development
Risk factors

Capacities

Disease / disorder characterization

Clinical data

Violence and risk assessment and management

Contact

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Research line

Our group, GEAV, works frequently for Justice, Correctional, Police and Victim Services to develop guides and protocols to prevent violence (especially interpersonal violence). The recent collaborations has been produced some new protocols like RISCANVI (for prison violence management), the RVD-BCN for to prevent gender violence in social, police and sanitary services. Other area in innovation is to build programs for the treatment of sexual offenders (youth or adults) and other offenders in prison or community arrangements. Also the members of GEAV act as an international consultants in violence prevention.

Keywords

Risk assessment
Sexual & gender violence
Offender's treatment
Violence and mental health
Forensic
HCR-20 v3, SVR-20, SARA

Capacities

Disease / disorder characterization Antisocial and violent behaviour

Treatment discovery Offenders' treatment

Clinical data Violence and antisocial features

Development of new tools / technologies / methods Risk assessment tools / actuarial

Aging and quality of life

Research line

- Quality of life in Alzheimer's disease
- Caregiver burden in Alzheimer Disease
- Depression in Elderly
- Cognitive decline in Aging
- Needs of family caregivers of Alzheimer patients

Contact

J. L. Conde-Sala
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Capacities

Disease / disorder characterization	Alzheimer
Assessment of new treatments	Support for family
Methods for diagnostic	Longitudinal analysis
Clinical data	SHARE (Survey of Health, Ageing and Retirement in Europe)
Others	Needs, well-being and quality of life of family caregivers

Keywords

Quality of life
Depression
Caregiver burden
Neuropsychiatric symptoms
Aging
Cognitive decline

Interventions in Clinical and Health Psychology

Research line

- Assessment and interventions for depressive and anxiety disorders
- Efficacy of psychological therapies
- The role of personal constructs and cognitive conflicts in several areas of clinical and health psychology

Contact

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Capacities

Disease / disorder characterization	Mental health and psychosomatic problems
Treatment discovery	Dilemma-Focused Therapy and other constructivist interventions
Assessment of new treatments	Use of the Clinical Outcomes in Routine Evaluation - Outcome Measure (CORE-OM)
Methods for diagnostic	Repertory Grid Technique for the identification of cognitive conflicts
Clinical data	Sociodemographic and health data
Development of new tools / technologies / methods	Software for Repertory Grids analysis, new assessment tools

Keywords

Psychotherapy
Mental health
Clinical and health psychology
Cognitive therapies
Personal constructs theory
Psychotherapeutic process

Clinical and Health Psychology

Contact

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Research line

• Virtual Reality and other new technologies applications for research, assessment and treatment of psychological disorders.

Keywords

Mental disorders
Mental health
Virtual reality
Assessment
Treatment

Capacities

Disease / disorder characterization

Treatment discovery

Assessment of new treatments

Methods for diagnostic

Clinical data

**Development of new tools /
technologies / methods**



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