bcbl

**BASQUE CENTER
ON COGNITION, BRAIN
AND LANGUAGE**

2017
2020

BASQUE CENTER
ON COGNITION, BRAIN
AND LANGUAGE

2017
2020

INDEX

This document covers the activity report of the Basque Center on Cognition, Brain and Language (BCBL) during the period 2017-2020.

The BCBL was created with the mission of performing world-class research on the cognitive processes and the brain mechanisms that underlie language processing, with special emphasis on bilingualism and multilingualism, and of pursuing excellence in research, training and knowledge transfer within the field of Cognitive Neuroscience of Language.

We set up a well-equipped laboratory with exceptional facilities. The laboratories of the BCBL are equipped with cutting-edge technological platforms such as MRI, MEG, EEG, NIRS, eye tracking, and other behavioral techniques. Having access to advanced methods enables us to ask sophisticated questions at the frontiers of knowledge. Moreover, the combination of two typologically very different languages opens a singular window to investigate brain mechanisms and cognitive processes of language.

Grant success has been strong from both national and international sources, including the highly competitive European Research Council and other competitive grants from other funding bodies, such as the Ministry for Science and Innovation and the 7th Framework and the Horizon2020 programs of the European Union. Importantly, the BCBL was awarded the label of excellence "Severo Ochoa" for the period 2016-2019.

The researchers are currently organized into twelve research groups, each one directed by a group leader. The management team (scientific director, general manager, and group leaders),

with the help of support personnel, are looking for continuous improvement in all aspects. Importantly, the selection of talented people is the key to create an extraordinary intellectual atmosphere to achieve goals that we sometimes believe are impossible. To recruit and retain the best researchers, the BCBL has implemented the Human Resources Strategy for Researchers (HRS4R) Seal of Excellence, launched a Gender Action Plan to support diversity and equity, and also adopted the European Commission's recommendations for open, transparent and merit based recruitment policies.

Furthermore, the BCBL is committed to education and knowledge transfer. In collaboration with the University of the Basque Country (UPV/EHU), we created a Master's Program entitled "Cognitive Neuroscience of Language" that has been running since September 2011. We have also recently created a PhD program named "Cognitive Neuroscience". Finally, related to knowledge and technological transference, we created Neure, a clinic for the diagnosis of developmental disorders, where new diagnosis software systems are being developed as well.

These are exciting times for research in Cognitive Neuroscience of Language in the Basque Country. To learn more about our activities in the period 2017-2020, read what is in the pages to come.

Manuel Carreiras
Director of the BCBL
January, 2021

01

THE
CENTER

The Basque Center on Cognition, Brain and Language is a world class interdisciplinary research center for the study of cognition, brain, and language, jointly founded by Innobasque, Ikerbasque, UPV-EHU and the Provincial Government of Gipuzkoa.

The BCBL is a multidisciplinary research center within the Basque Science, Technology and Innovation Network (RVCTI), devoted to pursuing excellence in research, training, and knowledge transfer in the cognitive neuroscience of language.

Our research activity aims to unravel the neurocognitive mechanisms involved in the acquisition, comprehension and production of language, with special emphasis on bilingualism and multilingualism.

We study processes involved in normal child language acquisition and second language learning in adults, as well as learning disorders, language disorders, the language-related effects of aging, and neurodegeneration and language use in different social contexts.

Language is a unique human ability that involves complex cognitive processes. Reading and writing are among our most impressive cultural developments; as individuals, developing these skills are major milestones, fundamentally changing how we interact with our environment. However, despite the impressive technological and scientific advances of recent decades, we have not yet unravelled the complexities of the cognitive processes involved in language, especially reading. We still do not know the causes of some language disorders and reading disabilities and how to remediate them. The BCBL carries out research in these fascinating areas, using the most advanced techniques.

Manuel Carreiras
BCBL Director

1.B MISSION, VISION

To provide a platform for researchers and professionals from related disciplines to carry out frontline research, development and innovation in cognitive neuroscience and language.

AIM OF OUR RESEARCH

Our research aims to unravel the neurocognitive mechanisms involved in the acquisition, comprehension and production of language, with special emphasis on bilingualism and multilingualism.

We study processes involved in normal child language acquisition and second language learning in adults, as well as learning disorders, language disorders, language-related effects of aging and neurodegeneration and language use in different social contexts.

OUR COMMITMENT

Our commitment to the transfer or knowledge about cognitive neuroscience extends to the education, healthcare, social, and business environments. We aim to apply the knowledge and technology derived from our research to advance the welfare of society.

To this end, we have forged links with institutions and organizations in both the local and broader communities, to provide expertise, consultancy and technology development services, all at the highest international quality standards.

RESEARCH AGENDA

We take advantage of our center's setting in the bilingual Basque Country to study language processing in Basque and Spanish. As a language isolate, Basque has unique characteristics and so provides us with an unrivalled opportunity to uncover both the specific and the universal characteristics of language.

To pursue our aims, we use a variety of methods, including cutting-edge neuroimaging techniques, behavioral methods, and computational modelling, developing our projects and also collaborating with other public and private institutions.

VISION

BCBL aspires to become internationally recognized as a Basque center of research excellence in the Cognitive Neuroscience of Language:

· Focusing on globally-relevant strategic objectives, specifically aimed at supporting the competitive devopment of science, economy and society in the Basque Country.
· Leading efficient cooperation between the various stakeholders in the Basque system of research and development.
· Seeking to make the Basque Country a magnet and focus of attention for activities related to the cognitive neuroscience of language.
· Promoting and continually improving the transmission of knowledge generated by our research for the greater benefit of society.

VALUES

1] Promotion of research
2] Personal development
3] Social commitment – dissemination of knowledge
4] Commitment to constant improvement
5] Result-focused
6] Promotion of interculturality
7] Integrity

To this end, we have forged links with institutions and organizations in both the local and broader communities, to provide expertise, consultancy and technology development services, all at the highest international quality standards.

AIMS OF THE BCBL

1] To develop research and innovation in cognitive neuroscience with special emphasis on language processing and bilingualism.

2] To promote scientific research and national and international scientific relationships within the area of cognitive neuroscience, and to transfer the results of this research for the benefit of community.

3] To promote the transfer and dissemination of knowledge about cognitive neuroscience, language and bilingualism both within and beyond the Basque Country, by means of organizing courses, seminars, national and international conferences and effective public media and forums.

4] To participate in undergraduate and postgraduate education and training programss and encourage young researchers to join our area of research.

5] To facilitate training and ongoing development of BCBL personnel and to promote collaboration across different lines of research.

6] To forge collaborative links and common interest areas with public and private institutions, centers and industries, with the aim of providing research, training, technological and consultancy services that take full economic and social advantage of the research and technologies developed at BCBL.

2.A PARTNERS
2.B GOVERNANCE
2.C PEOPLE

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ORGANIZATION AND GOVERNANCE

BCBL was established as a Non-profit
Association on November 19, 2008.
The Association currently comprises
the following founding partners:

Ikerbasque
Basque Foundation for Science
www.ikerbasque.net

Innobasque
Basque Innovation Agency
www.innobasque.eus

Provincial Government of Gipuzkoa
www.gipuzkoa.eus

University of the Basque Country
www.ehu.eus

Basque Government
www.euskadi.eus

[The **General Assembly** is the
Association's supreme governing body;
it includes all members.
The Steering Committee is the
body responsible for administering
the Association; it ensures that
the Articles of the Association
are complied with and that the
agreements reached at the General
Assembly are fulfilled.

The Chairmen of the BCBL's General
Assembly and Steering Committee for
the 2017-2020 period have been:

Fundación Ikerbasque
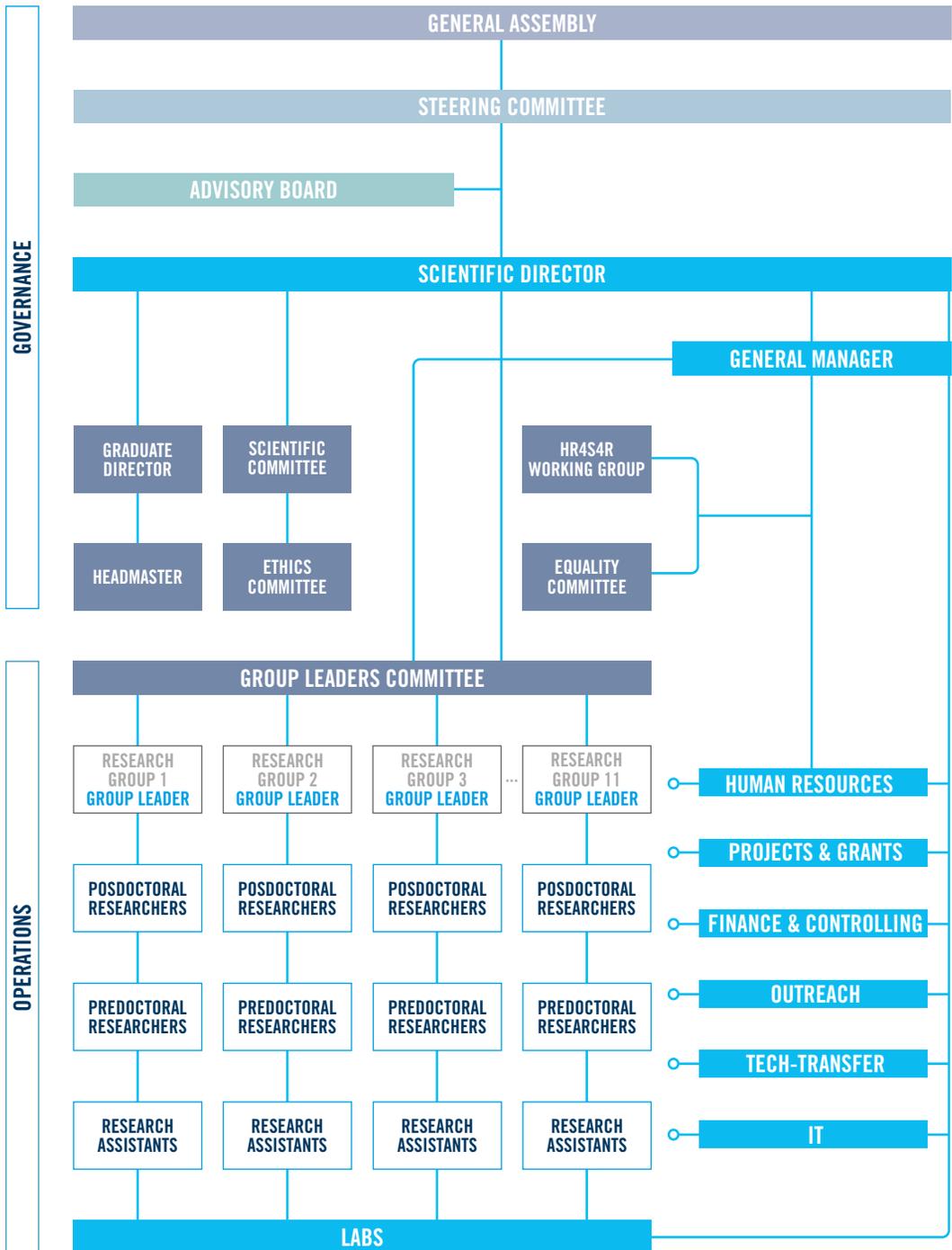represented by:

[2017-2020
Aldofo Morais Ezquerro
Viceconsejero de Universidades e
Investigación del Gobierno Vasco
(Basque Government Deputy
Councilor for Universities and
Research).

2.B GOVERNANCE

2.B.1 Organizational Chart

2.B.2 ISAB, International Scientific Advisory Board

The main role of the International Scientific Advisory Board is to advise on the center's orientation and overall strategy. The International Scientific Advisory Board comprises internationally renowned researchers and professionals.

The members of the International Scientific Advisory Board for the 2017-2020 period were:

[George R. Mangun, Ph.D. (Chair)
· *Distinguished Professor of Psychology and Neurology*
· *Director, Center for Mind and Brain*
· *Dean Emeritus of Social Sciences*
· *University of California, Davis, U.S.A.*

[Anne Cutler, Ph.D.
· *Distinguished Professor, The MARCS Institute, Western Sydney University, AUSTRALIA*
· *Director Emeritus, Max Planck Institute for Psycholinguistics, THE NETHERLANDS*

[William Marslen-Wilson
· *Honorary Professor of Language & Cognition, Department of Experimental Psychology*
· *Director Emeritus, MRC Cognition & Brain Sciences Unit, University of Cambridge, U.K.*

[James L. McClelland, Ph.D.
· *Lucie Stern Professor in the Social Sciences, Department of Psychology*
· *Director, Center for Mind, Brain and Computation, Stanford University, U.S.A.*

[Cathy J. Price, Ph.D.
(appointed in September 2020, ratification at next Steering Committee meeting in 2021)
· *Professor of Cognitive Neuroscience*
· *Director, Wellcome Centre for Human Neuroimaging*
· *Queen Square Institute of Neurology*
· *University College London, U.K.*

[Timothy Shallice, Ph.D.
· *Professor and Director Emeritus, Institute for Cognitive Neuroscience, University College London, U.K.*
· *Professor Emeritus, Scuola Internazionale Superiore di Studi Avanzati, ITALY*

2.B.3 Internal Organization: Committees & Working Groups

The **Scientific Director** provides scientific and management leadership in the BCBL by defining and coordinating the implementation of the overall strategy of the center. The Scientific Director promotes a comfortable atmosphere that stimulates high-quality research production, efficient collaborative management, and technical support. As the main center representative, the Director also designs and promotes alliances and relationships with partners and stakeholders to achieve BCBL's primary objectives. While the director of the center provides leadership, responsibilities are highly distributed among researchers, fostering collegial strategic decisions.

In 2019 he was awarded with the "Pascual Madoz" National Research Prize 2019, in the area of Law and Economic and Social Sciences. This award acknowledges the merit of those Spanish researchers who are carrying out outstanding scientific work in fields of international relevance and contribute remarkably to the progress of science, to a better understanding of human beings and their coexistence, to tech transfer and to the progress of humanity.

HR EXCELLENCE IN RESEARCH

GROUP LEADERS' COMMITTEE

The **Group Leaders' Committee**, which includes the Scientific Director, the General Manager, and the Group Leaders, meets once per month to coordinate activities, recruitment, lab organization, and funding to establish priorities, follow the progress of research projects, and support management and outreach structures at the center.

SCIENTIFIC COMMITTEE

The **Scientific Committee** evaluates all the projects to be carried out in the BCBL and is composed by three Group Leaders, currently, Clara Martin, Nicola Molinaro and Kepa Paz Alonso. The **Ethics Committee** evaluates that all the projects comply with the ethical rules and is composed by three Group Leaders, currently Marina Kalashnikova, Marie Lallier and Simona Mancini. Additionally, when external advice is needed we contact the Euskadi Ethics Committee.

TEACHING COMMITTEES

The **PhD Graduate Directors** in charge of running the PhD programs are two Group Leaders, currently David Soto and Arthur Samuel.

The **Headmasters** in charge of running our MSc program are two Group Leaders, currently César Caballero and Arthur Samuel.

The Graduate Director will be responsible for monitoring Pre-doc researcher progress through discussions with the Student's Supervisors and review of the annual student progress reports prior to submission to the upv/ehu's GAUR system every September.

In case a Supervisor has a significant disagreement with a student, the Graduate Director can be contacted to discuss the necessary steps to solve the conflict.

HRS4R WORKING GROUP

The 'HR Strategy for Researchers' supports research institutions and funding organizations in the implementation of the Charter & Code in their policies and practices. The concrete implementation of the Charter & Code by BCBL from 2016 renders us more attractive to researchers looking for a new employer or a host for their research project. The BCBL has implemented the Charter & Code principles that contribute to the attractiveness of our national research system and, more generally, of the European Research Area.
In 2017 we received the European Commission's HRS4R (Human Resources Strategy for Researchers) award.

We are currently improving our OTM-R process which includes the following steps: (1) Pre-advertising; (2) Advertising and Application; (3) Evaluation/Selection; (4) Appointment; (5) Negotiation; (6) Welcome Plan.

EQUALITY WORKING GROUP

The BCBL Gender Action plan is managed by the **Equality Working Group** and, as a result of this plan, the current situation is that 56% of BCBL employees are female. This balance in the proportion of female/ male employees comes as a result of a strategy that is based on two main pillars: (1) No gender distinction in terms of salary. The salary level depends on responsibility and/or research level, regardless of gender; (2) Promotion is always achieved based on performance, regardless of the gender of the employee.

RESEARCH GROUPS

The **Researchers** are grouped into research groups that dynamically change/increase as research programs develop, new human resources are recruited, or new grants are obtained. They are led by a Group Leader (see full list at www.bcbl.eu). The Group Leader provides expert guidance to PhD students and postdoctoral researchers and is also responsible for establishing the research goals of the group and for managing the group budget.

OMBUDSMAN

The **Ombudsman Team** is made up of members of the Administrative and Research staff, who are elected to form part of the team based on proposals and consensus from the doctoral and postdoctoral researchers. The Team is currently composed of Ana Fernández (Admin), Brendan Costello (Research) and Arthur Samuel (Research). The Ombudsman Team has several functions, including providing conflict resolution, offering advice and support to BCBL staff, monitoring work practice issues, and making recommendations for improvement.

MANAGEMENT TEAM

The **Management Team** led by the General Manager supports all research activities, crossing the organizational chart transversally (See 2.B.1 Organizational chart). This includes support for departments such as Administration (finance control, projects and grants management, human resources, and outreach), Information Technologies, Laboratories, and Tech-Transfer. It is important to highlight that since many researchers are foreigners, the BCBL needs a group of trained research assistants in its four different laboratories to be able to run experiments in the local languages, Basque and Spanish.

**THE RESEARCH
AND SUPPORT STAFF
AT THE BCBL
TODAY IS:**

DR. MANUEL
CARREIRAS

DR. MIGUEL
AROCENA

11

DIRECTOR

GENERAL
MANAGER

GROUP
LEADERS

7

17

43

9

14

STAFF
SCIENTISTS

POST-DOCTORAL
RESEARCHERS

PRE-DOCTORAL
RESEARCHERS

AFFILIATED
RESEARCHERS

LABORATORIES
DEPARTMENT

3

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INFORMATION
TECHNOLOGIES
& TECHNICAL

ADMINISTRATION

TECHNICAL
TRANSFER
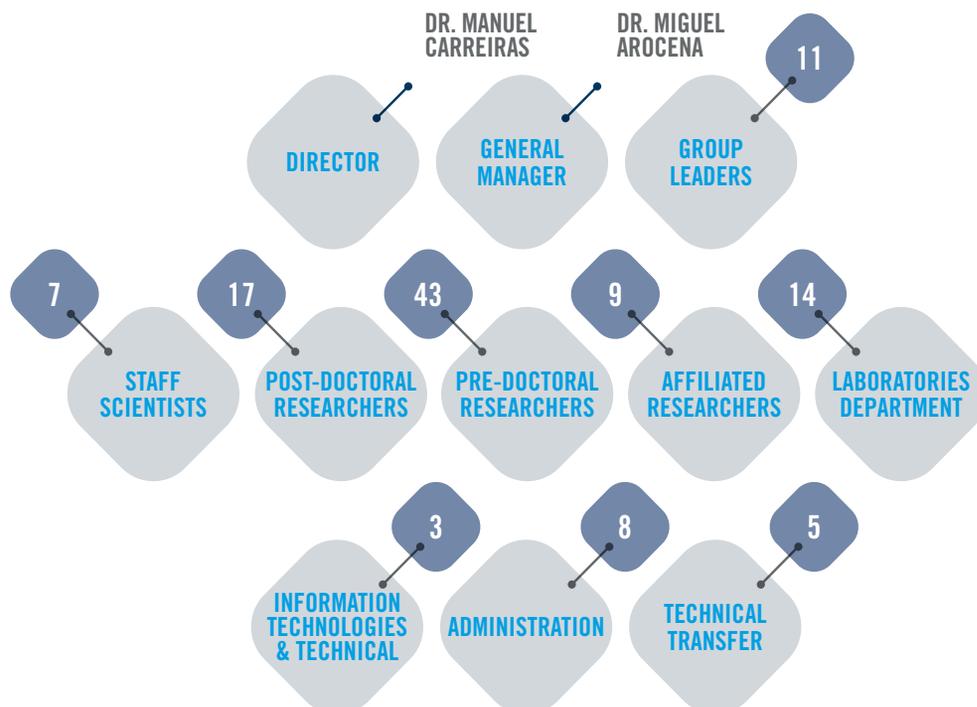
2.C PEOPLE

DIRECTOR

Manuel Carreiras
2008-today
Ikerbasque Research Professor

GENERAL MANAGER

Miguel A. Arocena
2009-today

GROUP LEADERS

César Caballero
2012-today
Ramón y Cajal Spanish Ministry Fellow

Ram Frost
2019-today
Senior Scientist

Marina Kalashnikova
2018-today
Ramón y Cajal Spanish Ministry Fellow
Ikerbasque Research Fellow

Marie Lallier
2010-today
Ramón y Cajal Spanish Ministry Fellow

Simona Mancini
2010-today
Ramón y Cajal Spanish Ministry Fellow

Clara Martin
2012-today
Ikerbasque Research Professor

Nicola Molinaro
2009-today
Ikerbasque Research Associate

P.M. (Kepa) Paz-Alonso
2022-today
Ikerbasque Research Associate

Mª Cruz Rodríguez-Oroz
2015-2019
Ikerbasque Research Professor

Arthur Samuel
2010-today
Ikerbasque Research Professor

David Soto
2016-today
Ikerbasque Research Professor

STAFF SCIENTISTS

Sendy Caffarra
2013-today
Marie Skłodowska-Curie Fellow

Brendan Costello
2010-today
Juan de la Cierva Spanish Ministry Fellow

Doug Davidson
2010-2019

Monika Molnar
2010-2017

Ileana Quiñones
2011-today

Craig Richter
2018-today
Ramón y Cajal Spanish Ministry Fellow

Elena Salillas Pérez
2010-2017

Lucia Amoruso
2017-today
Juan de la Cierva Spanish Ministry Fellow
Ikerbasque Research Fellow

POSTDOCTORAL RESEARCHERS

Elger Abrahamse
2018-2019
Ikerbasque Research Fellow

Daniel Alcalá López
2018-2020

Alexia Antzaka
2019-today

Loretxu Bergouignan
2014-today

Nicoletta Biondo
2017-2019

Mathieu Bourguignon
2015-2019

Francesca Branzi
201-2017

Amaia Carrión
2020-today
Juan de la Cierva Spanish Ministry Fellow
Fellows Gipuzkoa

Jesús Cespón
2018-today
Marie Skłodowska-Curie Fellow

Angela de Bruin
2016-2019
Marie Skłodowska-Curie Fellow

Raquel Garrido
2017-2018

Marcel Giezen
2015-today
Marie Skłodowska-Curie Fellow

Sara Guediche
2016-today
Marie Skłodowska-Curie Fellow

James Hartzell
2017-2020

Mireia Hernandez
2016-2018
Fellows Gipuzkoa

Liv Hoversten
2017-2020
Juan de la Cierva Spanish Ministry Fellow

Efthymia Kapnoula
2016-today
Juan de la Cierva Spanish Ministry Fellow
Marie Sklodwska Curie Fellow

Natalia Kartushina
2016-2018
Swiss National Science Foundation Fellow

Anastasia Klimovich-Smith
2018-today
Marie Skłodowska-Curie Fellow

Maria Koutsogiannaki
2017-2019

Garikoitz Lerma
2012-today
Marie Skłodowska-Curie Fellow

Mikel Lizarazu
2019-today

Rocio Lopez-Zunini
2016-today
Juan de la Cierva Spanish Ministry Fellow

Eugenia Marín
2015-2017
Marie Skłodowska-Curie Fellow

Mikhail Ordin
2015-today
Ikerbasque Research Fellow

Alejandro Pérez
2010-2017
ITN Marie Skłodowska-Curie Fellow

Svetlana Pine
2019-today
Juan de la Cierva Spanish Ministry Fellow

Leona Polyanskaya
2016-today
Marie Skłodowska-Curie Fellow

Marie Pourquie
2014-2017

Sandra Pusil Arce
2019-2020

Dipanjan Ray
2020-today

Antje Stoehr
2018-today
Marie Skłodowska-Curie Fellow

Maite Termenon
2017-today
Juan de la Cierva Spanish Ministry Fellow

Lisa B. Wilson
2016-2018
Marie Skłodowska-Curie Fellow

PREDOCTORAL RESEARCHERS

Jose Aguasvivas
2017-today
La Caixa INPhINIT Fellow

Patricia Alves Dias
2014-2018
CNPq-Brasilian Ministry Fellow

Xabier Ansorena
2018-today
FPI Spanish Ministry Fellow

Eneko Antón
2011-2017
BFI Basque Government Fellow

Karen G. Arellano
2020-today
FPI Spanish Ministry Fellow

Jaione Arnaez
2015-2020
BFI Basque Government Fellow

Irene Arrieta
2019-today
BFI Basque Government Fellow

Ainhoa Bastarrika
2012-2017
BFI Basque Government Fellow

Borja Blanco
2014-2020
BFI Basque Government Fellow

Peter Boddy
2013-2017

Maria Borragan
2016-2019
La Caixa Fellow

Begoña Carcedo
2017-2020

Francisco Javier Carrera
2020-today
BFI Basque Government Fellow

Inés Chavarría
2020-today
FPI Spanish Ministry Fellow

Catherine Clark
2019-today
FPI Spanish Ministry Fellow

Florent Dueme
2018-today
La Caixa INPhINIT Fellow

Teresa Esteban
2017-today
FPI Spanish Ministry Fellow

Noemi Fariña Díaz
2014-2018
FPI Spanish Ministry Fellow

Yuriem Fernandez
2013-2017

Laura Fernández
2020-today
FPI Spanish Ministry Fellow

Irene Fernández
2012-2018

Vicente Ferrer
2018-today
BFI Basque Government Fellow

Candice Frances
2017-today
FPI Spanish Ministry Fellow

Alberto Furgoni
2018-today
La Caixa INPhINIT Fellow

Marta García
2019-2020

Lorna García
2010-2017

Meritxell Garcia
2019-today
BFI Basque Government Fellow

Shuang Geng
2018-today
FPI Spanish Ministry Fellow

Sandra Gisbert
2017-today
FPI Spanish Ministry Fellow

Kirk Goddard
2019-today

Kshipra Gurunandan
2017-today
La Caixa INPhINIT Fellow

Pavlina Heinzova
2016-today
BFI Basque Government Fellow

Maddi Ibarbia
9/7/05-today
FPI Spanish Ministry Fellow

Lela Ivaz
2014-2018
FPI Spanish Ministry Fellow

Mina Jevtovic
2019-today
FPI Spanish Ministry Fellow

2.C PEOPLE

Soan Kim
2020-today

Leandro Lecca
2020-today
FPI Spanish Ministry Fellow

Mengxing Liu
2018-today
La Caixa INPhINIT Fellow

Lucía Manso
2020-today
FPI Spanish Ministry Fellow

Pedro Margolles
2018-today
FPI Spanish Ministry Fellow

Alejandro Martínez
2012-2018
BFI Basque Government Fellow

Jordi Martorell
2017-today
FPI Spanish Ministry Fellow

Joyse Medeiros
2013-2017
CAPES-Brasilian Ministry Fellow

Ning Mei
2018-today
FPI Spanish Ministry Fellow

Ahmed Mohammed
2016-2017
Qatar Foundation Fellow

Stefano Moia
2018-today
La Caixa INPhINIT Fellow

Piermatteo Morucci
2017-today
La Caixa INPhINIT Fellow

Sanjeev Nara
2017-today
FPI Spanish Ministry Fellow

Eugenia Navarra
2017-today
FPI Spanish Ministry Fellow

Mikel Ostiz Blanco
2015-2019
La Caixa Fellow

Romain Pastureau
2019-today
FPI Spanish Ministry Fellow

Jovana Pejovic
2012-2018
BFI Basque Government Fellow

Jose Javier Pérez
2017-today
FPI Spanish Ministry Fellow

Carlos Pérez
2018-today
FPI Spanish Ministry Fellow

Giorgio Piazza
2019-today
La Caixa INPhINIT Fellow

Paula Ríos López
2014-2018

Bojana Ristic
2014-2020
BFI Basque Government Fellow

Chiara Rivolta
2018-today
La Caixa INPhINIT Fellow

Abraham Sanchez
2020-today
FPI Spanish Ministry Fellow

Dana Scarinci
2016-2019
La Caixa Fellow

Sophie Schlöffel
2012-2018
BFI Basque Government Fellow

Usman Sheikh
2016-today
FPI Spanish Ministry Fellow

Christoforos Souganidis
2018-today
FPI Spanish Ministry Fellow

Ioanna Taouki
2018-today
La Caixa INPhINIT Fellow

Trisha Thomas
2019-today
BFI Basque Government Fellow

ADMINISTRATION STAFF

Jon Aldaz Martín
2020-today

Nerea Arcelus
2017-2018

Leire Arietaleanizbeascoa
2009-today

Asier Carcedo
2017-today

Ana Fernández
2009-today

Vanessa Gallardo
2009-today

Nora Gomez
2017-2017

Maider Goñi
2011-today

Joana Izurieta
2010-today

Eider Juaristi
2009-today

Ane Larreategui
2019-2020

Larraitz Lazcano
2018-today

Laura Outeiral
2015-2017

Iñigo Romero
2015-2018

**INFORMATION TECHNOLOGIES
& TECHNICAL STAFF**

Iker Blanco
2013-2018

Borja Chantre
2011-today

Jose Corral
2009-today

Asier Eguibar
2017-2018

Javier Gutierrez
2013-today

Faizan Muhammad
2018-2019

Maialen Otamendi
2017-2018

Ander Ramos
2019-2020

Xabier Rojo
2011-2017

LAB MANAGERS

Larraitz López
2010-today

Oihana Vadillo
2010-today

LAB SECTION COORDINATOR

Elena Aguirrebengoa
2011-today

Itziar Basterra
2012-today

David Carcedo
2011-today

Mamen González
2011-today

Manex Lete
2015-today

LABORATORIES STAFF

Magda Altmann
2019-today

Irati Aperribay
2017-2019

Asier Beramendi
2018-2019

Amaia Cano
2017-2019

Paula Castellanos
2018-2018

Ariane Delgado
2018-2018

2.C PEOPLE

Ainhoa Eguiguren
2016-today

Leire Eizaguirre
2019-today

Eztizen Elorza
2015-2017

Aiora Enparantza
2019-today

Amets Esnal
2015-today

Jon Imanol Etxabe
2016-2020

Nahikari Etxeberria
2016-2017

Ariane Etxeberria
2017-2019

Unai Hernandez
2020-2020

Xabier Intxausti
2018-2019

Jone Iraeta
2019-2019

Oihane Iturbe Ansa
2019-2019

Patricia Jiménez
2019-today

Aitor Martin
2016-2017

Jorge Martínez de Lahidalga
2019-2019

Sara Martinez
2015-2018

Núñez Macarena
2019-2019

Itziar Olabarrieta
2017-2019

Iker Oteiza
2019-today

Edith Ramos
2019-2020

Edith Ramos
2019-2019

Julia Reichert
2017-2018

Miguel Ángel Sampedro
2017-2018

Noelia Sanchez
2017-2017

Olatz Unceta
2016-2017

Itzal Uranga
2012-2017

Alaitz Urkizu
2019-2020

Ane Zurutuza
2018-2019

TECH TRANSFER

Agara Agirre
2016-2018

Amaia Aierbe
2019-today

Javier Centeno
2019-2019

Sara Cerezo
2019-2019

Olaia Cuadrado
2017-2017

Uxue Doñate
2012-2018

Nekane Galparsoro
2012-today

Carolina Gómez
2019-2019

Laura López
2019-2019

Leire Lucas
2018-today

Eider Matilla
2018-today

Daniel Melero
2019-2020

Montserrat Pérez
2018-2020

Maite Redondo
2018-today

Mikel Sevilla
2018-today

Martin Tarragona
2017-today

Oiane Urrestarazu
2018-2020

2.C.1

RESEARCH GROUPS

As of December 2020, the research groups are constituted as follows.

[01 NEUROBIOLOGY OF LANGUAGE

The Neurobiology of Language group looks at how the brain represents and processes language in typical as well as atypical populations, for example, when people with deafness or dyslexia read texts.

Examining speech-brain synchronization allows us to identify children at risk for dyslexia and to develop interventions based on neurofeedback that enhance rhythmic sensitivity.

Additionally, we investigate how plasticity allows the brain to adjust to new or unusual circumstances, such as acquiring a new language or the appearance of a brain lesion.

Our studies with bilinguals of different types (including sign language users) provide insight into whether differences between languages and modalities are reflected in underlying neural networks.

We conduct longitudinal research with language learners of different types and brain tumor patients to map language function and to track macrostructural and functional plasticity.

GROUP LEADER

Manuel Carreiras
BCBL Director
Ikerbasque Research Professor

STAFF SCIENTIST

Lucia Amoruso
Sendy Caffarra

POSTDOCTORAL RESEARCHERS

Jesús Cespón
Brendan Costello
Marcel Giezen
Sandra Pusil
Ileana Quiñones

PREDOCTORAL RESEARCHERS

José A. Aguasvivas
Shuang Geng
Sandra Gisbert
Chiara Luna Rivolta
Polina Timofeeva

[02 SPOKEN LANGUAGE

Speech is a unique evolutionary achievement that has played an enormous role in human development. We investigate how this system works and what the underlying neural mechanisms are.

These investigations focus on a range of questions. For example, using behavioral and MEG techniques, we are looking at individual variation in the brain lateralization of speech processing.

Using fMRI, we are examining how cognates affect activation of brain regions in bilingual word recognition. We have a set of studies that explore the relationship between speech perception and production, including experiments that reflect the sometimes inhibitory effect one may have on the other.

Ongoing research is testing the role of sleep, exploring some language acquisition cases in which sleep consolidates information, and others in which sleep can help to clear out information that is no longer needed. Collectively, our research efforts are advancing the field's understanding of spoken language processing.

GROUP LEADER

Arthur Samuel
Ikerbasque Research Professor

POSTDOCTORAL RESEARCHERS

Sara Guediche
Efthymia Kapnoula
Rocío A. López-Zunini
Leona Polyanskaya
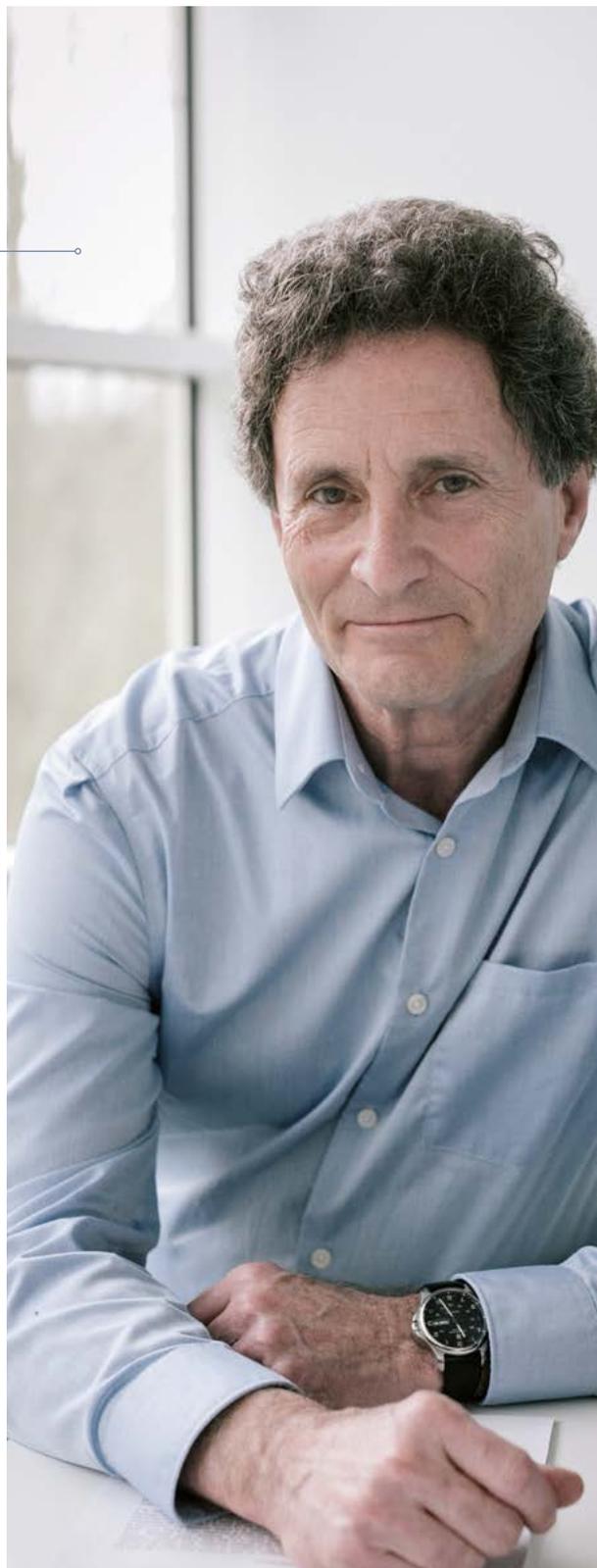
[03 CONSCIOUSNESS

We are developing new protocols to understand the distinction between conscious and non-conscious information processing in the human brain, and its role in guiding cognition and behaviour. We combine advanced brain imaging procedures, psychophysical tasks and state-of-the-art computational methods.

Our research encompasses multiple cognitive domains, including perceptual selection, learning and memory, and language, as well as metacognition—our ability to reflect, monitor and control our own cognitive processes.

We study these topics in children, healthy adults and patients. We are committed to translating our findings for the benefit of the wider society, by developing educational and clinical applications through targeted neurocognitive interventions that can promote adaptive behavioral change.

GROUP LEADER

David Soto
Ikerbasque Research Professor

POSTDOCTORAL RESEARCHERS

Mikhail Ordin

PREDOCTORAL RESEARCHERS

Begoña Carcedo
Marta García
Pedro Margolles
Ning Mei
Carlos Pérez-Serrano
Usman Ayub Sheikh

[04 SPEECH AND BILINGUALISM

Our main objective is to explore speech perception and production, their interplay and control, with a specific focus on language interactions in the bilingual mind.

We aim to explore factors impacting **speech production and perception in L1 and L2**, including contextual properties (e.g., foreign accentedness of the speaker/addressee). We also focus on factors influencing and optimizing **L2 speech sound and word learning** (e.g., orthography, consciousness, cross-modality interactions). Another line of research targets **bilingual language control** by exploring L1/L2 language interference in word and sentence perception and production in monolingual and bilingual (switching) modes.

We recently started a large-scale ERC project investigating the i**mpact of the orthographic system on speech sound and word perception and production** across modalities (listening, reading, speaking, typing), languages (opaque and transparent orthographies), and populations (monolinguals and bilinguals with varying reading skills).

GROUP LEADER

Clara Martin
Ikerbasque Research Professor

POSTDOCTORAL RESEARCHERS

Alexia Antzaka
Liv Hoversten
Svetlana Pinet
Antje Stoehr

PREDOCTORAL RESEARCHERS

Florent Dueme
Candice Frances
Alberto Furgoni
Mina Jevtović
Eugenia Navarra
Giorgio Piazza
Trisha Thomas

[05   BRAIN RHYTHMS AND COGNITION

The human brain processes and analyzes complex information within fractions of a second, overcoming both input ambiguity and noise. In our group, we use time-resolved neuroimaging techniques (MEG and EEG) to understand the computational dynamics and architecture of language processing.

The temporal structure of the surrounding environment provides cues that help the brain optimally sample external stimuli and orchestrate appropriate responses.

The Proactive group explores how the brain encodes visual, auditory and linguistic rhythms by focusing on neural oscillatory activity. Based on this approach we investigate predictive processing in language comprehension, music processing and visual and attentional processes.

These research lines merge into the more general goal of detecting oscillatory neural components that lead to the development of language disorders across the lifespan.

GROUP LEADER

Nicola Molinaro
Ikerbasque Research Associate

POSTDOCTORAL RESEARCHERS

Mathieu Bourguignon
Anastasia Klimovich-Gray
Mikel Lizarazu
Craig Richter

PREDOCTORAL RESEARCHERS

Jordi Martorell
Piermatteo Morucci
Sanjeev Nara
Christoforos Souganidis

[**06** LANGUAGE AND MEMORY CONTROL

Cognitive neuroscientists, engineers and mathematicians work together in the Language and Memory Control group to unravel the neural basis of high cognitive functions using an array of behavioral, functional (task-related, resting-state) and structural (volumetric, diffusion MRI, quantitative MRI) MRI techniques and a range of analytical approaches.

We investigate how high cognitive functions result from interactions between different cognitive components, focusing mostly on language (reading, speech comprehension and production) and memory (semantic, autobiographical, episodic) systems across the life span in both cognitively normal and clinical populations.

Our current research program includes studies on thalamocortical contributions to language systems, differential involvement of visual pathways in word processing, brain plasticity associated with language learning and cognitive training, executive attention, episodic memory retrieval, creativity, and advanced MRI methods.

GROUP LEADER

P.M. (Kepa) Paz-Alonso
Ikerbasque Research Associate

POSTDOCTORAL RESEARCHERS

Loretxu Bergouignan
James Hartzell
Garikoitz Lerma-Usabiaga

PREDOCTORAL RESEARCHERS

Jaione Arnaez
Kshipra Gurunandan
Maddi Ibarbia
Mengxing Liu

2.C.1 Research groups

[07 NEUROLINGUISTICS AND APHASIA

The Neurolinguistics and Aphasia group focuses on the study of language comprehension, production and learning across a wide spectrum of populations from adult monolingual and bilingual speakers to language-impaired brain-damaged patients.

By using a variety of experimental methods (electrophysiology, eye tracking and behavioral paradigms), we investigate how basic syntactic structures and relations are built online, track their time course and electrophysiological correlates, and determine how these change at different stages of L2 learning or in the presence of language impairment.

Moreover, we develop standardized aphasia assessment tools that enable us to study how the breakdown of these core mechanisms can be reliably detected and treated in patients with brain damage.

GROUP LEADER

Simona Mancini

POSTDOCTORAL RESEARCHERS

Nicoletta Biondo

PREDOCTORAL RESEARCHERS

Xabier Ansorena
Pavlína Heinzová
Bojana Ristic

2.C.1 **Research groups**

[08

SIGNAL PROCESSING IN NEUROIMAGING

SPIN-Group. Our group broadly focuses on investigating advanced methods for the acquisition and analysis of neuroimaging and biomedical data in order to advance our understanding of human brain function, structure and physiology.

With a focus on cognitive and clinical neuroscience, our current projects mainly concern the development of signal processing algorithms for functional magnetic resonance imaging and functional near-infrared spectroscopy, including signal denoising and deconvolution, physiological and neurovascular processes, functional connectivity analyses, decoding and encoding brain activity, and multimodal imaging. We aim to apply these methods to examine the functional organization of large-scale brain networks and how they shape cognition in single individuals and across subjects in healthy and diseased conditions across their lifespan.

GROUP LEADER

César Caballero

POSTDOCTORAL RESEARCHERS

Maite Termenon

PREDOCTORAL RESEARCHERS

Borja Blanco
Teresa Esteban
Stefano Moia
Eneko Uruñuela

2.C.1 Research groups

[09 INFANT LANGUAGE AND COGNITION

Our group investigates the process of early language acquisition, specifically the emergence and consolidation of speech perception and word-learning over monolingual and bilingual infants' first two years of life, as well as interactions between these early language abilities and the development of general perceptual and cognitive capacities.

The primary aim of this research is to define the earliest determinants of later individual language ability, including but not limited to endogenous factors, such as family risk for developmental language disorders or hearing loss, and environmental factors, such as the quantity and quality of infants' early language input.

We address these questions through cross-sectional and longitudinal designs that combine neurophysiological (EEG, fNIRS), behavioral (visual preference, eye-tracking), and observational (parent-infant interactions) techniques in the BCBL BabyLab.

GROUP LEADER

Marina Kalashnikova
Ikerbasque Research Fellow

PREDOCTORAL RESEARCHERS

Irene Arrieta
Laura Fernández

2.C.1 Research groups

[10 STATISTICAL LEARNING AND LANGUAGE

Individual differences in the ease or difficulty of mastering a second language are related to individual differences in learning regularities in the environment. This perspective has lead to the current interest in statistical learning as an individual-specific ability and how it impacts success in second language learning.

Our current research focuses on statistical learning from both the behavioral and neurobiological perspectives and examines its relation to literacy acquisition, taking into account the unique aspects of languages' orthographic and morphological systems.

Individual differences in the ease or difficulty of mastering a second language are related to individual differences in learning regularities in the environment. This perspective has lead to the current interest in statistical learning as an individual-specific ability and how it impacts success in second language learning.

Our current research focuses on statistical learning from both the behavioral and neurobiological perspectives and examines its relation to literacy acquisition, taking into account the unique aspects of languages' orthographic and morphological systems.

Experimental work involves methods from computational linguistics and machine learning used to precisely characterize the statistics of contrasting writing systems, as well as state-of-the-art neuroimaging techniques including EEG, MEG, fMRI used to probe the neurobiological mechanisms for detecting regularities in both the visual and auditory modalities, targeting the what, where, and how of statistical learning and its neural links to L2 learning.

GROUP LEADER

Ram Frost

STAFF SCIENTIST

Craig Richter

POSDOCTORAL RESEARCHERS

Dipanjan Ray

AFFILIATED RESEARCHER

Blair Armstrong

[11 DEVELOPMENTAL LANGUAGE DISORDERS

The Developmental Language Disorders group investigates developmental disorders related to language, such as dyslexia and specific language impairments.

In particular, we investigate how the orthographic properties of a language (orthographic consistency and transparency) influence the reading strategies used by bilingual children (with typical and atypical trajectories) when they read in their two languages. In addition, we study the development of reading sub-skills (i.e., phonemic awareness, rapid automatized naming, visual attention span) in bilingual pre-readers and readers.

We also investigate whether the proximal cause of developmental dyslexia may be found in atypical auditory oscillatory functions affecting phase-amplitude cross-frequency coupling, and inter-hemispheric communication, with the special aim of uncovering neural biomarkers for dyslexia.

GROUP LEADER

Marie Lallier

PREDOCTORAL RESEARCHERS

Catherine Clark
Jose Pérez-Navarro
Ioanna Taouki
Camila Zugarramurdi

2.C PEOPLE

2.C.2 Fellowships

Spanish Ministry of Science and Innovation 48

[Ramón y Cajal Senior Fellowships 5
[Juan de la Cierva Formación Fellowships 7
[Juan de la Cierva Incorporación Fellowships 6
[FPI Predoctoral Fellowships 27
[PTA Fellowships for Technicians 3

H2020 Framework Programme 13

[Marie Curie Individual Fellowship 13

Basque Government 28

[Ikerbasque Research Professor Fellowships 5
[Ikerbasque Research Associate Fellowships 2
[Ikerbasque Research Fellowships 6
[BFI Predoctoral Fellowships 15

Gipuzkoa Government 4

[Postdoctoral Fellowships 4

Caixa Foundation 13

[INPhINIT Predoctoral Fellowships 10
[Predoctoral Fellowships 3

Other International Organizations 4

[Predoctoral Fellowships 3
[Postdoctoral Fellowships 1

PI	Grant	Funding Agency	Amount	Period
P.M. (Kepa) Paz-Alonso	Ramón y Cajal	Spanish Ministry	208.600 €	01/01/2016 31/12/2020
Marie Lallier	Ramón y Cajal	Spanish Ministry	208.600 €	01/04/2017 31/03/2022
Simona Mancini	Ramón y Cajal	Spanish Ministry	208.600 €	01/02/2019 31/01/2024
César Caballero	Ramón y Cajal	Spanish Ministry	208.600 €	01/02/2019 31/01/2024
Marina Kalashnikova	Ramón y Cajal	Spanish Ministry	208.600 €	01/09/2020 31/08/2025
Leona Polyanskaya	Juan de la Cierva Formación	Spanish Ministry	50.000 €	01/12/2016 30/11/2018
Joao Correia	Juan de la Cierva Formación	Spanish Ministry	50.000 €	01/05/2017 30/04/2019
Efthymia Kapnoula	Juan de la Cierva Formación	Spanish Ministry	50.000 €	01/03/2018 20/06/2020
Liv Hoversten	Juan de la Cierva Formación	Spanish Ministry	50.000 €	01/12/2019 30/06/2020
Brendan Costello	Juan de la Cierva Formación	Spanish Ministry	50.000 €	01/01/2019 31/05/2021
Rocio López Zunini	Juan de la Cierva Formación	Spanish Ministry	50.000 €	01/01/2019 31/05/2021
Maite Termenon	Juan de la Cierva Formación	Spanish Ministry	50.000 €	01/01/2019 31/05/2021
César Caballero	Juan de la Cierva Incorporación	Spanish Ministry	64.000 €	01/11/2016 31/10/2018
Jesús Cespón	Juan de la Cierva Incorporación	Spanish Ministry	64.000 €	01/01/2018 31/12/2019
Sendy Caffarra	Juan de la Cierva Incorporación	Spanish Ministry	64.000 €	01/05/2018 30/11/2019
Lucia Amoruso	Juan de la Cierva Incorporación	Spanish Ministry	64.000 €	03/01/2019 28/02/2021
Amaia Carrión	Juan de la Cierva Incorporación	Spanish Ministry	64.000 €	01/01/2020 31/12/2021
Svetlana Pinet	Juan de la Cierva Incorporación	Spanish Ministry	64.000 €	01/01/2020 31/12/2021
Lela Ivaz	FPI	Spanish Ministry	83.900 €	03/02/2014 02/02/2018

PI	Grant	Funding Agency	Amount	Period
Noemí Fariña	FPI	Spanish Ministry	83.900 €	13/01/2014 12/11/2018
Usman Sheikh	FPI	Spanish Ministry	88.250 €	05/01/2017 11/30/2020
Jose Javier Pérez Navarro	FPI	Spanish Ministry	88.250 €	05/01/2017 04/30/2021
Candice Frances	FPI	Spanish Ministry	88.250 €	05/01/2017 01/08/2021
Eugenia Navarra	FPI	Spanish Ministry	88.250 €	05/01/2017 04/30/2021
Teresa Esteban	FPI	Spanish Ministry	88.250 €	05/01/2017 04/30/2021
Maddi Ibarbia	FPI	Spanish Ministry	88.250 €	05/01/2017 04/30/2021
Sanjeev Nara	FPI	Spanish Ministry	88.250 €	05/01/2017 01/22/2021
Sandra Gisbert	FPI	Spanish Ministry	88.250 €	05/01/2017- 02/28/2021
Christoforos Souganidis	FPI	Spanish Ministry	88.250 €	07/01/2018 06/30/2022
Xabier Ansorena	FPI	Spanish Ministry	88.250 €	07/01/2018 06/30/2022
Polina Timofeeva	FPI	Spanish Ministry	88.250 €	07/01/2018 06/30/2022
Jordi Martorell	FPI	Spanish Ministry	95.450 €	07/01/2019 06/30/2023
Shuang Geng	FPI	Spanish Ministry	95.450 €	07/01/2019 06/30/2023
Ning Mei	FPI	Spanish Ministry	88.250 €	07/01/2018 06/30/2022
Pedro Margolles	FPI	Spanish Ministry	88.250 €	09/01/2018 08/31/2022
Mina Jetovic	FPI	Spanish Ministry	95.450 €	09/01/2019 08/31/2023
Catherine Clark	FPI	Spanish Ministry	95.450 €	09/01/2019 08/31/2023

PI	Grant	Funding Agency	Amount	Period
Carlos Perez Serrano	FPI	Spanish Ministry	95.450 €	09/01/2019 08/31/2023
Laura Fernández	FPI	Spanish Ministry	89.660 €	01/10/2020 30/09/2024
Ines Chavarria	FPI	Spanish Ministry	89.660 €	01/10/2020 30/09/2024
Karen Arellano	FPI	Spanish Ministry	89.660 €	01/10/2020 30/09/2024
Romain Pastereau	FPI	Spanish Ministry	89.660 €	01/10/2020 30/09/2025
Leandro Lecca	FPI	Spanish Ministry	89.660 €	01/10/2020 30/09/2026
Ines Lucía Manso	FPI	Spanish Ministry	89.660 €	01/10/2020 30/09/2027
Abraham Sanchez	FPI	Spanish Ministry	89.660 €	01/11/2020 30/10/2024
Mamen González	PTA	Spanish Ministry	36.000 €	01/11/2014 31/10/2017
Elena Aguirrebengoa	PTA	Spanish Ministry	36.000 €	01/11/2014 31/10/2017
Itziar Basterra	PTA	Spanish Ministry	36.000 €	01/11/2014 31/10/2017
Eugenia Marín	Marie Skłodowska-Curie	European Comission	158.121 €	01/09/2015 31/08/2017
Marcel Giezen	Marie Skłodowska-Curie	European Comission	170.121 €	01/07/2015 30/06/2017
Lisa Wilson	Marie Skłodowska-Curie	European Comission	170.121 €	14/03/2016 13/03/2018
Rocio López Zunini	Marie Skłodowska-Curie	European Comission	170.121 €	01/06/2016 20/09/2018
Angela de Bruin	Marie Skłodowska-Curie	European Comission	158.121 €	01/09/2017 31/08/2019
Garikoitz Lerma	Marie Skłodowska-Curie	European Comission	257.191 €	01/09/2018 31/08/2021
Leona Polyanskaya	Marie Skłodowska-Curie	European Comission	170.121 €	10/09/2018 30/12/2020
Marina Kalashnikova	Marie Skłodowska-Curie	European Comission	170.121 €	01/12/2018 30/11/2020

PI	Grant	Funding Agency	Amount	Period
Sara Guediche	Marie Skłodowska-Curie	European Comission	158.121 €	01/07/2019 30/06/2021
Sendy Caffarra	Marie Skłodowska-Curie	European Comission	245.732 €	01/01/2020 31/12/2022
Jesús Cespón	Marie Skłodowska-Curie	European Comission	172.932 €	01/01/2020 31/12/2021
Antje Stoehr	Marie Skłodowska-Curie	European Comission	172.932 €	01/01/2020 22/04/2022
Efthymia Kapnoula	Marie Skłodowska-Curie	European Comission	170.121 €	01/9/2019 31/12/2021
Manuel Carreiras	Research Professor	Ikerbasque	150.000 €	01/01/2009 permanent
Arthur Samuel	Research Professor	Ikerbasque	150.000 €	01/01/2015 permanent
David Soto	Research Professor	Ikerbasque	80.000 €	01/02/2016 permanent
Mª Cruz Rodríguez-Oroz	Research Professor	Ikerbasque	54.000 €	01/01/2015 31/12/2019
Clara Martin	Research Professor	Ikerbasque	62.000 €	01/10/2019 permanent
Clara Martin	Research Associate	Ikerbasque	49.000 €	04/06/201 30/09/2019
Nicola Molinaro	Research Associate	Ikerbasque	61.000 €	01/01/2019 permanent
Clara Martin	Research Fellow	Ikerbasque	10.000 €	04/06/2012 03/06/2017
Nicola Molinaro	Research Fellow	Ikerbasque	92.000 €	01/01/2014 31/12/2018
Mikhail Ordin	Research Fellow	Ikerbasque	80.000 €	15/11/2015 14/11/2019
Elger Abrahamse	Research Felow	Ikerbasque	28.389 €	08/01/2018 15/08/2019
Lucia Amoruso	Research Fellow	Ikerbasque	43.000 €	01/03/2019 29/02/2024
Ainhoa Bastarrika	Predoctoral grant	Basque Government	72.738 €	01/01/2014 01/10/2017
Eneko Antón	Predoctoral grant	Basque Government	72.739 €	01/01/2014 01/08/2017

PI	Grant	Funding Agency	Amount	Period
Alejandro Martínez	Predoctoral grant	Basque Government	72.740 €	13/01/2014 12/01/2017
Sophie Schlöffel	Predoctoral grant	Basque Government	72.740 €	01/01/2015 31/12/2018
Jovana Pejovic	Predoctoral grant	Basque Government	72.740 €	01/01/2015 31/12/2018
Alexia Antzaka	Predoctoral grant	Basque Government	72.740 €	01/01/2015 31/12/2018
Jaione Arnaez	Predoctoral grant	Basque Government	72.740 €	25/01/2016 24/01/2019
Bojana Ristic	Predoctoral grant	Basque Government	72.740 €	25/01/2016 24/01/2019
Borja Blanco	Predoctoral grant	Basque Government	72.740 €	25/01/2016 24/01/2019
Pavlina Heinzova	Predoctoral grant	Basque Government	91.934 €	01/01/2018 22/04/2022
Trisha B. Thomas	Predoctoral grant	Basque Government	91.934 €	28/01/2019 27/01/2022
Meritxell	Predoctoral grant	Basque Government	91.934 €	15/01/2020 14/01/2024
Eneko Uruñuela	Predoctoral grant	Basque Government	91.934 €	15/01/2020 14/01/2024
Vicente Ferrer	Predoctoral grant	Basque Government	91.934 €	15/01/2020 14/01/2024
Irene Arrieta	Predoctoral grant	Basque Government	91.934 €	15/01/2020- 14/01/2024
Simona Mancini	Postdoctoral grant	Gipuzkoa Government	160.000 €	01/01/2014 31/12/2018
Mireia Hernandez	Postdoctoral grant	Gipuzkoa Government	44.500 €	01/04/2017 31/03/2018
Lucia Amoruso	Postdoctoral grant	Gipuzkoa Government	39.270 €	01/03/2018 28/02/2019
Amaia Carrión	Postdoctoral grant	Gipuzkoa Government	8.128 €	01/05/2020 today
Mikel Ostiz	Predoc La Caixa	Caixa Foundation	108.000 €	01/05/2015 01/04/2018
María Borragan	Predoc La Caixa	Caixa Foundation	108.000 €	01/11/2016 31/10/2019

PI	Grant	Funding Agency	Amount	Period
Dana Scarinci	Predoc La Caixa	Caixa Foundation	108.000 €	01/10/2016 30/09/2019
Jose Aguasvivas	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	04/02/2018 05/02/2021
Kshipra Gurunandan	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	02/10/2017 01/01/2021
Piermatteo Morucci	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	16/10/2017 15/01/2021
Stefano Moia	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	01/01/2018 31/03/2021
IoannaTaouki	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	23/01/2018 22/04/2021
Florent Dueme	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	15/10/2018 22/02/2022
Alberto Furgoni	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	15/10/2018 14/10/2021
Chiara Rivolta	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	15/10/2018 14/09/2021
Mengxing Liu	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	31/10/2018 30/09/2021
Giorgio Piazza	Predoc INPhINIT La Caixa	Caixa Foundation	115.092 €	01/11/2019 02/11/2022
Joyse Medeyros	Predoctoral grant	Ministério Educaçao Brasil	72.000 €	01/09/2013 31/08/2017
Patricia Diaz Alves	Predoctoral grant	CNPq Brasil	124.800 €	01/06/2014 31/05/2018
Camila Zugarramurdi	Predoctoral grant	Fundación Carolina	50.400 €	01/09/2017 31/08/2019
Natalia Kartushina	Postdoctoral grant	Swiss National Science Foundation	77.000 €	01/03/2016 31/08/2017

03

FACILITIES AND RESOURCES

3.A BUILDING

Today the BCBL has three sites. The headquarters (main laboratories and offices) are located in the San Sebastian Technology Park (Miramon) with a total surface area of 1,823 m^2 (1,170 m^2 for offices, meeting rooms, auditorium, library and lounge and 653 m^2 for labs). The second location is a 100 m^2 space located in the Jose Mª Korta building in the University of the Basque Country Campus. Finally, the BCBL extended its facilities with the Junior Lab in Vitoria (120 m^2).

3.B LABORATORIES

Miramón & Korta

The full complement of neuroscience methodologies is available, including EEG/ERP, MEG, and fMRI. All facilities are connected to a high-speed local network that also supports communication between user workstations.

As far as possible, the same stimulus presentation and data recording hardware and software are employed across the experimental facilities, to ensure comparable experimental setups across different experimental methods/platforms (Behavioral, MEG, MRI, EEG, Eye Tracking, babyLAB and NIRS).

For special-purpose applications, a skilled technical group supports the installation and use of different hardware and software.

Junior Lab

As a consequence of the numerous projects that imply child participation, the idea of creating a lab inside a school was explored. Today, the Junior lab is located in Carmelitas School in VITORIA. It is an external laboratory of the main BCBL lab with significant potential and possibilities for exploring language development in children.

It is equipped with 2 behavioral cabins, 1 eye tracker and 1 EEG. The behavioral cabins have a touch screen in order to ease participant performance. The EEG complies with the main laboratories EEG standards. The eye tracker is a cutting edge device. It is special as it has a mirror system allowing participants to move during the experiment. This feature is very critical in the case of child participation.

Murcia Lab

We also share a laboratory at the University of Murcia that allows us to have access to students with a different linguistic profile than the ones we have in the Basque Country.

Miramón
Headquarters
Donostia–San Sebastián

3 Behavioural
1 Production
1 MEG
(includes EEG,
EYETRACKING)
1 MRI
(includes EEG,
EYETRACKING)
3 EEG
2 Eyetracking
1 babyLAB
(includes
EYETRACKING,
CONDUCTUAL,
NIRS, EEG)

Korta
Lab
Donostia–San Sebastián
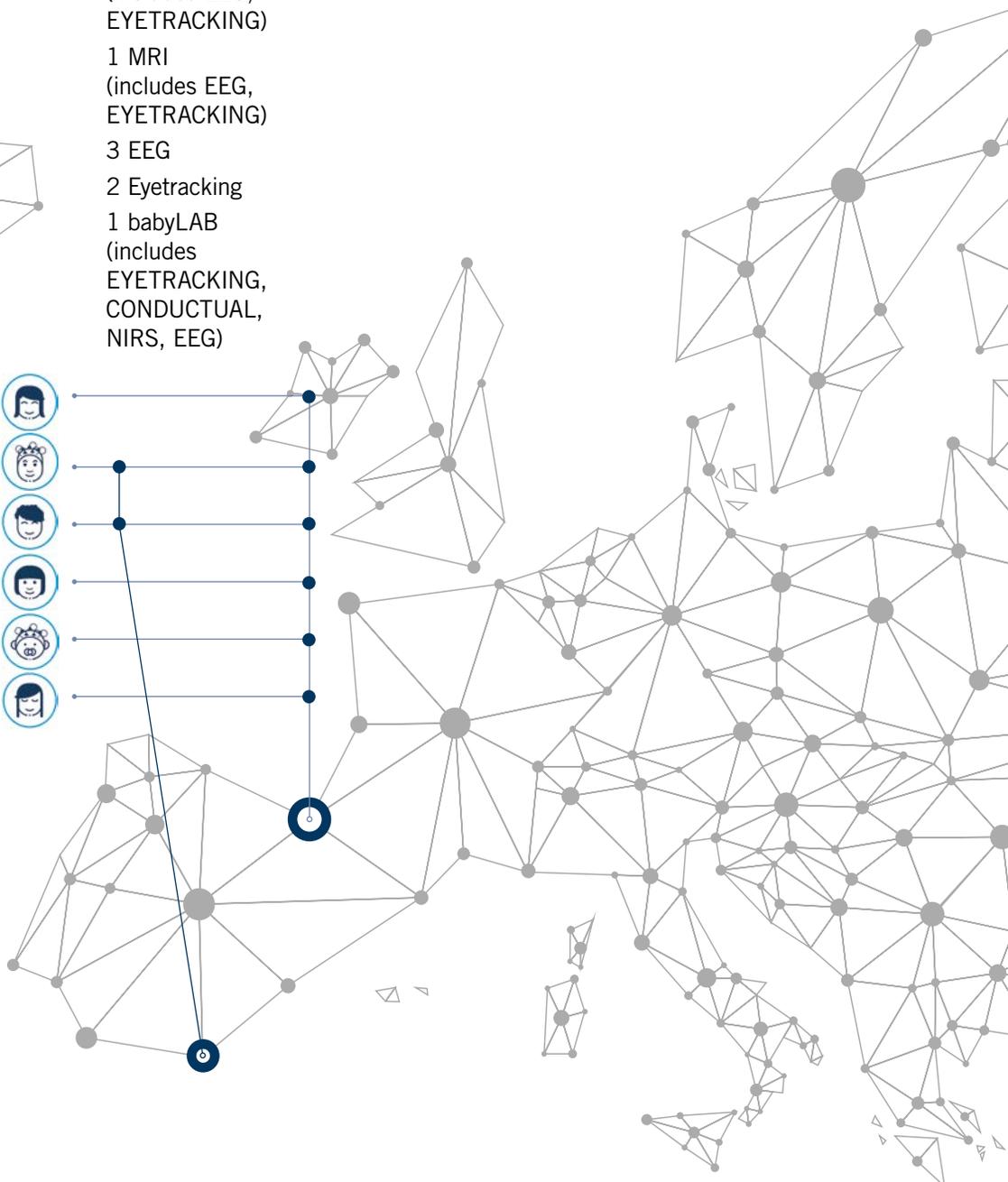
4 Behavioural
1 Production
1 Eyetracking

Junior
Lab
Vitoria-Gasteiz

2 Behavioural
1 Eyetracking
1 EEG

Murcia
Lab
Murcia

1 Behavioural
1 EEG

EYE-
TRACKING

EEG

BEH

MEG

BABY
LAB

fMRI

BEHAVIORAL

Ten soundproof chambers are available to conduct behavioral experiments. Each chamber is equipped with a standardized, quality, experimental setup, which can collect reaction-time data such as push-button responses or naming latencies.

Chambers can be used for individual testing sessions with one experimenter monitoring individual participants, as well as for testing up to 4 participants simultaneously.

The hardware for each chamber includes monitors (ViewSonic G90FB 19" CRT), soundcards (Soundblaster Titanium X-FI, with ASIO support) and headsets (Sennheiser HMD 280 pro push button response boxes).

The standard software packages are DMDX and Presentation but the technical group can build and develop special-purpose hardware and software when the standard configuration does not provide the functionality for a particular study.

MEG

Magnetoencephalography (MEG) provides a non-invasive method for recording cortical activity with exceptional temporal resolution and fine spatial resolution.

The MEG facility at the BCBL is a 306-sensor (204 planar gradiometers and 102 magnetometers; arranged in a helmet configuration) Elekta Neuromag® device with 16 digital trigger lines and 8 auxiliary analog input channels. The setup will allow for the delivery of both auditory and visual stimuli, and recordings can be performed in either supine or sitting position. The MEG device also includes an integrated 64-channel EEG system (60 single channel and 4 differential electrodes) for simultaneous MEG and EEG recordings that can be acquired at a sampling rate of up to 8 kHz (5 kHz standard) in either AC or DC.

Throughout the experimental session, a participant's head position within the scanner is sampled so that the data can be linked to independently acquired anatomical MRI images.

The facility at the BCBL includes passive shielding to reduce external noise, as well as MaxFilter™ software, which filters artifacts as well as internal and external noise sources. For data analysis, the Elekta Neuromag® includes advanced analytical software, including powerful tools for visualization and source modeling of the recorded data.

MRI

Since June 2016 BCBL houses a Siemens 3T MAGNETOM PRISMAfit MR scanner that allows BCBL researchers to perform functional MRI (BOLD and perfusion ASL), structural MRI, diffusion-weighted MRI and MR Spectroscopy studies. This system uses the Siemens Total Imaging Matrix (TIM) 4G technology including the TimTX TrueForm and TimTX TrueShape technologies for parallel transmission and selective RF excitation for better B1 homogeneity, reduced Specific Absorption Rate (SAR), and enabling zoomed imaging with the ZOOMit application. The Tim 4G technology with up to 64 independent channels available for parallel reception are exploited with two dedicated 20-channel head coil and a 64-channel head/neck coil. The fully digital transmission and reception design with the DirectRF technology integrates all components inside the magnet room, connected with fiberoptic cables with the equipment room, for reduced noise and improved stability. The Prismafit system offers a large anatomical coverage with a maximum field of view (FOV) of 50 cm. Decisively, it comprises a unique XR 80/200 gradient coil with a maximum amplitude of 80 mT/m and a slew rate of 200 T/m/s simultaneously on all three axes for increased SNR in the most demanding applications, enabling us to obtain higher spatial and temporal resolutions, reduced scan times and excellent workflow with subject's comfort in mind. The scanner also integrates real-time monitoring of cardiac pulse, ECG and respiration signals.

The PRISMAfit system includes a new generation of MRI protocols, for example the CAIPIRINHA and MP2RAGE sequences for structural imaging, and the simultaneous multi-slice (SMS) sequences for highly-accelerated functional and diffusion-weighted imaging. The BCBL has a research agreement with Siemens Healthcare Spain for technological support and access to the latest MR sequences and protocols developed for MAGNETOM systems, as well as developing its own tailored MRI sequences with the Siemens IDEA and ICE programming environments. Furthermore, the BCBL has established agreements with international research centers (e.g. the Athinoula A. Martinos Center in MGH/Harvard, the CMRR at the University of Minnesota, the Donders Institute in Nijmegen) to make the best imaging protocols available to our researchers.

In addition, the BCBL MRI lab is equipped with multiple stimulation and response MR-compatible peripherals for all type of fMRI studies, including 4-button optical response pads (Current Designs), response grips (Nordic Neurolab), a rear-projection video display (Panasonic SXGA+ 7000), an audio system comprising noise-cancelling headphones (MR Confon) and microphone (Optoacoustics), S14 insert earphones (Sensimetrics), a MR-compatible EyeLink 1000 Plus eye-tracking system (SR Research), and a MP-150 BIOPAC system for external monitoring of physiological signals (e.g. cardiac pulse, respiration, electromyography and skin conductance). For simultaneous EEG-fMRI experiments, a MR-compatible BrainAmp Plus system with up to 64 electrodes (Brain Products) is also available.

EEG

The Center is equipped with six EEG systems that are installed in six Faraday cage - soundproof chambers. Each chamber is equipped with a BrainAmp DC® amplifier.

Using the recording software (Brain Recorder®) all the amplifier options, including the switch from DC to AC recording mode as well as selecting different filtering bandwidths, can be controlled. The BrainAmp DC® is more stable than older EEG systems in a variety of applications, and it supports simultaneous EEG/TMS and EEG/MEG input to the Brain Computer Interface and Neurofeedback.

Two chambers are equipped with a 64-channel system and two chambers with a 32-channel amplifier. The BrainAmp DC® is a portable amplifier which connects to any laptop and can be powered with batteries. As a result, the 32-channel amplifiers can also be used for experiments outside the center (e.g., in schools or hospitals).

Each chamber is also equipped with sets of electrodes that can be arranged on EasyCaps® in whatever pattern needed for a given experiment. Each cap has 64 equidistant electrode positions (10%-System); several different sizes are available, including those suitable for children.

For off-line EEG/ERP analyses, Vision Analyzer® 2.1 software is available on each computer via a network key.

Our Center is equipped with the hardware and software resources to carry out and analyze a wide range of on-line reading experiments and experiments using the visual world paradigm.

An EEG fMRI compatible BrainAmp MR Plus (32 channels) has recently been acquired and multimodal type experiments can therefore be carried out.

COMPUTING FACILITIES

The BCBL Information System provides high degrees of performance, reliability and availability of both data and computing resources. High-performance computing clusters allow the execution of sophisticated data analyses. Network services facilitate secure data sharing within and between research teams.
The extensive software resources include tools for development and execution of experimental tasks, data processing, and production of scientific communications. Fast delivery of network services is guaranteed by a high-speed optical backbone network.

The BCBL is integrated in the eduroam network, so the visitors/people from other institutions integrated in the eduroam network who are in transit at the BCBL are able to use our wifi service. In the same way, our staffs in transit are able to use the wifi service in the associated institutions.

Researchers thus have all the information technology that they need to design, execute, analyze, and report on an almost unlimited range of behavioral and neuroscientific investigations of language and cognition.

babyLAB

In our state-of-the-art infant lab, a number of methods and techniques are available to discover the first steps of human language development. The behavioral set-up supports the Visual Habituation, Head-turn Preference, and Intermodal Preferential Looking procedures to assess preverbal infants' general language skills (from 3to 12 months of age), and to investigate older infants' syntactic and lexical knowledge up to 28 months of age.

The behavioral set-up is supplemented with an electrocardiogram (ECG) system that collects heart rate recordings of the infant during behavioral tasks. ECG activity reflects how infants' attention is being modulated and regulated in the context of specific language experience.

In addition to the methods at the behavioral and physiological levels, we are also equipped with EEG/ERP systems suitable for infants and children. Electrophysiological recordings are advantageous in infancy as they provide a direct and online measurement of processing abilities; moreover, the exact same technique can be applied throughout the whole lifespan, making it possible to track language related developmental changes. Our EEG/ERP systems can be integrated with the ECG system as well.

The BCBL babyLAB offers a cutting-edge research venue within an exceptional environment for investigating monolingual and bilingual language development comprehensively.

NIRS

Near infrared spectroscopy is a light based imaging technique that may be of great value in our studies. In particular, our system, NIRScout, is an ultra-compact and scalable solution for applications where flexibility is the dominant concern. This system is ideally suited for longitudinal studies with children, combined EEG-functional NIRS studies and freely moving studies. For instance, it provides a flexible methodology for measuring cortical activity during overt speech production while avoiding some of the limitations of traditional imaging technologies. The BCBL Nirscout has eight illumination points and sixteen sensors, can enlarge, is EEG-compatible and has three caps from baby to infant studies available.

EYETRACKING

Our lab has one of the latest and most complete systems for eye tracking: EyeLink 2K (SR Research Ltd.).

EyeLink 2K provides an excellent sampling rate (2000 Hz) and is especially suitable for real-time data collection. EyeLink 2K can be used for monocular as well as binocular eye tracking, and the system is perfectly compatible with most contact lenses and eye glasses. This system has a very high average accuracy, down to 0.15º. Many paradigms can be implemented in the EyeLink 2K, such as the visual world paradigm, the boundary technique (parafoveal previews) or silent sentence reading. The EyeLink2K system uses a remote desktop mounting, which allows participants to be liberated of any head-mounted cameras.

The EyeLink 2K is also portable, which enables field work to be conducted in other locations than the center, depending on the needs of the test population.

4.A RESEARCH LINES
4.B RESEARCH PROJECTS

04

RESEARCH

1 / LANGUAGE DEVELOPMENT ACROSS THE LIFE SPAN

The study of language learning and language processing offers an exceptional window into neural plasticity mechanisms across the life span. Our research aims to trace the trajectory of language development from infancy through adulthood and to identify the endogenous and environmental factors that foster language acquisition in the first months of life, promote the consolidation of language abilities in childhood and adolescence, and prevent their decline in old age.

Our infancy research will lead to a framework for understanding early language acquisition that systematically weights the maturational and environmental factors that predict an individual child's proficiency in one or more languages. As a result of exposure to language input and rapid neural maturation during their first year of life, infants attune to and begin to acquire the specific linguistic system in their environment. These native language skills acquired in the first year of life (i.e., native speech perception and early vocabulary use) are determinants of children's language attainment later in childhood. We conduct longitudinal and cross-sectional studies with monolingual and bilingual infants from birth until preschool age, combining state-of-the-art neuroimaging (fNIRS, EEG), behavioral (eye-tracking), and observational methods (parent-infant interactions), to obtain systematic measures of language exposure, determine the neural correlates of language processing, and track the interaction and development of these factors over the first years of life.

Our research with school-age children will lead to novel breakthroughs in understanding how the brain supports the representation of meaning during language processing by combining functional MRI and MEG with state-of-the-art computational models, including encoding, decoding, and pattern-classification models to understand the semantic properties encoded in brain activity (i.e. using word embedding models and representational similarity analyses). We will also assess the impact of healthy aging by comparing the brain representational spaces of semantic knowledge in aging people with high and low cognitive reserve.

In addition to assessing the correlates of language processing at the cortical level, we will integrate sub-cortical measures by focusing on thalamic structure and thalamo-cortical connectivity. The thalamus is a diencephalic structure which has massive white matter fiber projections to almost the entire cerebral cortex. We examine the developmental trajectories of human thalamic nuclei gray-matter volumes and white matter connections to the cerebral cortex across the life span and examine their relation to individual differences in some of the main language systems: speech production, speech comprehension and reading.

Finally, we take advantage of information technology to develop computerized language training tools. We test the efficacy of these interventions in terms of enhancing the functionality of the brain circuitry that underpins language processing and preventing or delaying language deficits associated with aging.

2 / SPEECH PERCEPTION, PRODUCTIONS, AND DISORDERS

Speech is a unique evolutionary achievement that has played a critical role in human development. We study how this system works and identify its underlying neural mechanisms. In particular, we investigate: individual variation in the hemispheric lateralization of speech perception; the role of attention in speech perception (we evaluate speech-brain synchronization under noisy conditions); the relation between speech perception and production; interactions between listeners and speakers; whether early speech perception skills predict later language abilities; and the development of tools for diagnosis of language disorders.

Although the left hemisphere is generally dominant for language, there is considerable variation across individuals. We investigate this variation in different domains (print, spoken language) during speech perception, production and during the resting state, using MRI and MEG.

Recent evidence shows that ongoing oscillatory brain activity phase-aligns to the pseudo-rhythmic temporal patterns of speech. This "brain-speech synchronization" reflects tracking of the slow temporal modulations of the speech envelope. We test whether stronger cortical speech tracking predicts improved speech understanding. We study the role of attention in speech perception by evaluating speech-brain synchronization in ecologically noisy conditions. In particular, we examine how bilinguals deal with multiple speech inputs when the speech streams they have to attend to

or ignore are in the same or different languages. We also investigate how the brain responds to intelligible and unintelligible stimuli.

The usual assumption is that speech perception and speech production share representations – learning something about one will support learning the other. Our research looks at how learning speech is affected by producing speech. Using discrimination tests and eye tracking measures, we investigate whether production during learning impairs perceptual learning. Given that practice in second language learning classes typically involves students repeating what the teacher says, our research results are highly relevant for classroom practice. Classroom instruction also typically includes a substantial reading component. We investigate whether the way we perceive and produce speech sounds is strongly influenced by reading skills and orthographic rules.

Using behavioural and neural measures, we investigate the impact of speaker identity (e.g., foreign speaker, synthetized voice, avatar) on the listener's attentional load and information retention. This research will reveal how the properties of a speaker's voice influence memory, attention, and speech perception (usually studied independently).

Language disorders are typically diagnosed in pre-school or school, when children's expressive language abilities can be assessed. However, speech perception skills can already be measured in the first months of a child's life, providing early indicators of later language abilities such as vocabulary size and literacy.

We examine infants' early ability to discriminate speech sound contrasts that signal changes in meaning in their native language and to disregard contrasts that do not. We combine behavioral and neurophysiological (EEG) techniques to detect individual differences in monolingual and bilingual infants' discrimination of native and non-native sounds. We relate these potential early biomarkers to language ability in the second year of life.

Finally, we develop tools for diagnosis and remediation of language disorders with tasks designed in accordance with our latest research results on language processing.

3 / READING AND DYSLEXIA

Reading is one of the most exciting discoveries an individual can make. It is an essential skill for social, cultural, and economic exchange in modern societies yet 10% of the population has difficulties learning to read. We compare reading skills in typical and atypical (e.g., illiterate, deaf, or dyslexic) populations, using a range of specialized methods (e.g., EEG, fMRI, MEG, eye-tracking). We investigate the brain mechanisms that support reading and learning to read; the permanent changes to brain structure and function this learning generates; and how speech rhythms and phonological skills contribute to learning to read.

The left ventral occipitotemporal cortex (vOTC) is an important region in brain reading circuitry. We investigate to what extent different sub-areas within the vOTC are involved in orthographic, phonological and semantic computations and whether such computations are modulated by the use of different writing systems (alphabetic, non-alphabetic) or orthographic transparency. We carry out research on four highly contrasting languages: Spanish, English, Hebrew and Chinese.

To delineate the reading circuitry, we also combine functional laminar fMRI resolution measurements with high field strength (7 Tesla) MRI and advanced structural methods (e.g., quantitative MRI) to distinguish bottom-up and top-down signals to and from different layers of vOTC and their interactions with other areas of the cortex.

Learning to read relies on phonological awareness, namely learning

associations between orthographic representations and speech sounds, i.e., phonemes. Children acquire a complete phonemic repertoire by learning to segment the speech signals they are exposed to in the first years of life. We investigate the extent to which poor synchronization between oscillatory neural activity in the auditory cortices and attended speech rhythms results in atypical early speech processing that, in turn, can lead to developmental dyslexia. We are also interested in how people with dyslexia, who generally do not show comprehension deficits, compensate for poor speech-brain synchrony. It remains unclear whether they can take advantage of contextual information to segment and recognize speech input, and whether children with better speech-brain neural synchronization at the pre-reading stage develop better reading abilities.

Can we predict the reading behavior of children based on their speech-brain synchronization and the functional and structural characterization of their thalamocortical connections? We have an ongoing large-scale project to investigate if speech-brain synchronization evaluated in infancy constitutes a reliable neural marker for the potential development of reading disorders (especially in children at risk of dyslexia). We further aim to develop a mechanistic model of the role of the thalamic nuclei and thalamocortical connections in typical reading and dyslexia, and to develop computational models based on deep neural networks that can predict reading behavior from these brain measures, allowing us to estimate a child's future reading behavior from their pre-reading neural profile.

We are developing interventions for children at risk of dyslexia aimed at improving speech-brain synchronization using neurofeedback. A child's sensitivity to the rhythmic properties of speech may be enhanced by brain-computer interface protocols and by playing with rhythmic sounds and music. Moreover, we are building new tools for the diagnosis of dyslexia.

4 / MULTILINGUALISM

Half of the world's population speaks more than one language. However, we still do not understand how multilingualism changes our brain, how languages are represented in the brain, how the control system works to ensure that multilinguals do not mix languages while speaking, or how they switch easily between languages. Using advanced neuroimaging methods with unimodal and bimodal bilinguals and trilinguals, we investigate these issues to uncover the underlying brain mechanisms involved in managing two or more languages and learning a second language. This research will also provide major anchor points for education and society, pointing to the language learning conditions that maximize outcomes for children and adults acquiring a native and/or an additional language.

By testing bimodal bilinguals and trilinguals, we investigate whether the same or different neural networks are involved within and across modalities (signed and spoken language). We also explore the interplay between semantic, orthographic and phonological similarity across languages at the behavioural and neural levels, to provide insight into the functional and neuroanatomical mechanisms of second language processing and flexibility in spoken language processing (e.g., under adverse listening conditions).

We investigate the selectivity of language co-activation, during perception and production, in bilinguals under low versus high cognitive control demands. In addition, we investigate language switching (bilinguals alternating producing words in one language or the other) and code-switching (bilinguals perceiving sentences that contain language switches) in more 'ecological' settings (e.g., voluntary language switching) to understand how bilinguals exercise online control of their languages.

The impact of bilingualism on executive control is very controversial. Using eye-tracking, we are assessing perceptual flexibility and attentional processes in pre-verbal monolingual and bilingual infants, months before speech production is developed. This will reveal the earliest effects of bilingual exposure on perception and attention and enable us to track the development of processing strategies specific to early bilingualism. Then, we will explore the effects of early bilingualism on word learning, speech perception, brain-to-speech synchronization, reading skills, and reading strategies, in order to reveal the impact of early bilingualism on a large range of language processing abilities in young children and adults.

Using behavioural, eye-tracking and electrophysiological measures, we test whether higher sensitivity to within-category phonemic differences helps listeners learn novel speech sound categories; probe the neural basis for the well-documented finding that diversity in auditory input improves learning; and examine if the perception/production interplay in speech sound learning. In particular, we examine the impact of repeating/writing a novel sound-letter association on oral/written production, and the impact of L1 and L2 orthography on L2 sound learning. We expect to gain major insights into links between perception and production in speech sound learning, and the permeability

of these processes. This research will have significant impact on theories and models of speech perception and production, as well as theories and applications for second language acquisition.

5 / NEURODEGENERATION, BRAIN DAMAGE, AND REHABILITATION

Language deficits are a common consequence of traumatic brain injury, stroke, epilepsy, tumours, and neurodegenerative diseases. They are a primary cause of disability worldwide and have dramatic social implications. We investigate brain biomarkers for early detection of disease and the potential for language recovery through brain plasticity or compensatory mechanisms in the injured brain. We further translate this knowledge into the development of rehabilitation paradigms.

Neurodegenerative diseases have attracted considerable attention in the scientific community, not only because of the basic insights they provide into cognition, but also because of their extensive societal implications. Latest estimates indicate that in Spain there will be around 1.500.000 Alzheimer patients by the year 2020. In addition, it is estimated that 2% of the elderly population over 65 will have developed Parkinson's disease. Many neurodegenerative diseases involve a deterioration of core cognitive abilities, including linguistic deficits characteristic of primary progressive aphasias. Since language disorders are one of the earliest expressions of these diseases, they also function as early disease markers, enabling timely treatment and the development of novel therapeutic strategies.

Our overarching goal is to identify the behavioral and neural compensatory mechanisms that emerge in the presence of brain damage, but also the effects of linguistic and non-linguistic interventions on promoting plasticity, both after stroke and in the presence of neurodegenerative diseases. We investigate how linguistic as well as non-linguistic (musical, visuo-spatial) interventions can help stroke patients in the early acute phase to recover cognitive function. Using longitudinal within-subject designs, we carry out systematic evaluations of the effects such interventions have on cognitive, linguistic and brain recovery during the early acute stage, when the potential for neuroplasticity is higher. Furthermore, we design behavioral and computer-based intervention tools to slow down the progressive erosion of linguistic functions and enhance the efficient use of remaining cognitive abilities. In addition, we investigate the efficiency of intervention tools by measuring structural and functional brain and behavioral changes.

Low-grade gliomas represent 15% of all primary brain tumors diagnosed in adults. Due to their slow growth, they allow the brain to progressively adapt and transfer linguistic functions from damaged to healthy areas alleviating severe neurological symptoms. Thus, neuroplasticity mechanisms can be traced before and after surgery, providing new insights into language compensation and network reshaping. By implementing a longitudinal design that maps language function with fMRI and MEG before and after tumor resection, we investigate biomarkers of language recovery in bilingual and monolingual patients. At the clinical level, we translate basic experimental knowledge to inform daily neuro-oncological practice, helping neurosurgeons plan and optimize surgery patient-specific strategies. For this purpose, we develop personalized cognitive tasks that, in combination with direct electrical stimulation during surgery, help identify the functional boundaries of language-relevant tissue and thereby spare language functionality. In collaboration with neurosurgeons we seek to minimize the risk of post-operative language deficits, improving each patient´s quality of life.

6 / LANGUAGE AND OTHER COGNITIVE SYSTEMS

Language processing requires reciprocal and recursive interactions with other cognitive systems. Understanding language involves unravelling the mechanisms and dynamics that allow language to support other cognitive functions and vice versa. In this research line, we investigate language interactions with learning and memory, attention, perception, metacognition and the motor system.

Language is strongly intertwined with memory. Our knowledge and representations of the world (semantic memory) are at the base of language processing. Language also shapes our episodic memories. We investigate interactions between language and semantic and episodic memory. How are episodic memories transformed into semantic memories? To what extent do verbal semantic and episodic memories share the same neural circuitry? How does semantic memory retrieval transiently fail during tip-of-the-tongue experiences? In a series of MRI studies, we investigate these questions seeking to build a precise neurocognitive model of the interactions between verbal semantic and episodic memory. Also, given the influence of sleep on learning and memory consolidation, we study how newly learnt linguistic information is differentially consolidated and whether sleep also clears out information that was activated for particular tasks, but that is not going to be of long-term use.

Attention is an angular cognitive function at the basis of multiple processes, including language function. Research on brain oscillations has underscored their critical role in shaping the flow of linguistic information in cortical networks.

Distinct oscillatory frequencies are associated with the direction of this information flow in the brain. Using MEG, we investigate the interactions of top-down and bottom-up cortical signals, which are thought to play a major role in cognitive and perceptual processes, such as language, selective attention, and prediction. Speech comprehension is also tied to auditory perceptive processes. How music and speech comprehension interact in shaping the harmonic sensitivity of the human auditory regions is still a mystery. We investigate how musical training (perception of sounds) and language proficiency (abstract linguistic knowledge) interact. We investigate how speech is encoded in the neural signals exhibited by musicians with variable levels of formal training and experience in playing an instrument. The goal is to understand if neural speech processing is mainly explained by tracking the acoustics of the auditory signal or if it is driven by abstract knowledge of the perceived language.

Metacognition, the capacity to reflect on one's own cognition and behavior, can also support language processing. We are studying the role of metacognition in language learning and the potential translational implications of this metacognitive research for educational settings. We are adopting a novel, groundbreaking neurodevelopmental approach to investigate how primary school children's metacognitive abilities relate to their ability to learn across linguistic and non-linguistic domains. We further analyze how individual

differences in metacognition predict academic achievement across different neurodevelopmental samples.

Finally, language function also interacts with the motor system. Using MEG, we investigate if conceptual representations related to action/ verb words are rooted in sensorimotor systems. The main objective is to shed light on the links between the motor and language systems and how they can jointly contribute to human communication. The results from these studies can further inform language rehabilitation treatments in neurodegenerative motor disorders, as well as potentially pave the road for intervention programs where motor training is used to improve language performance in applied settings.
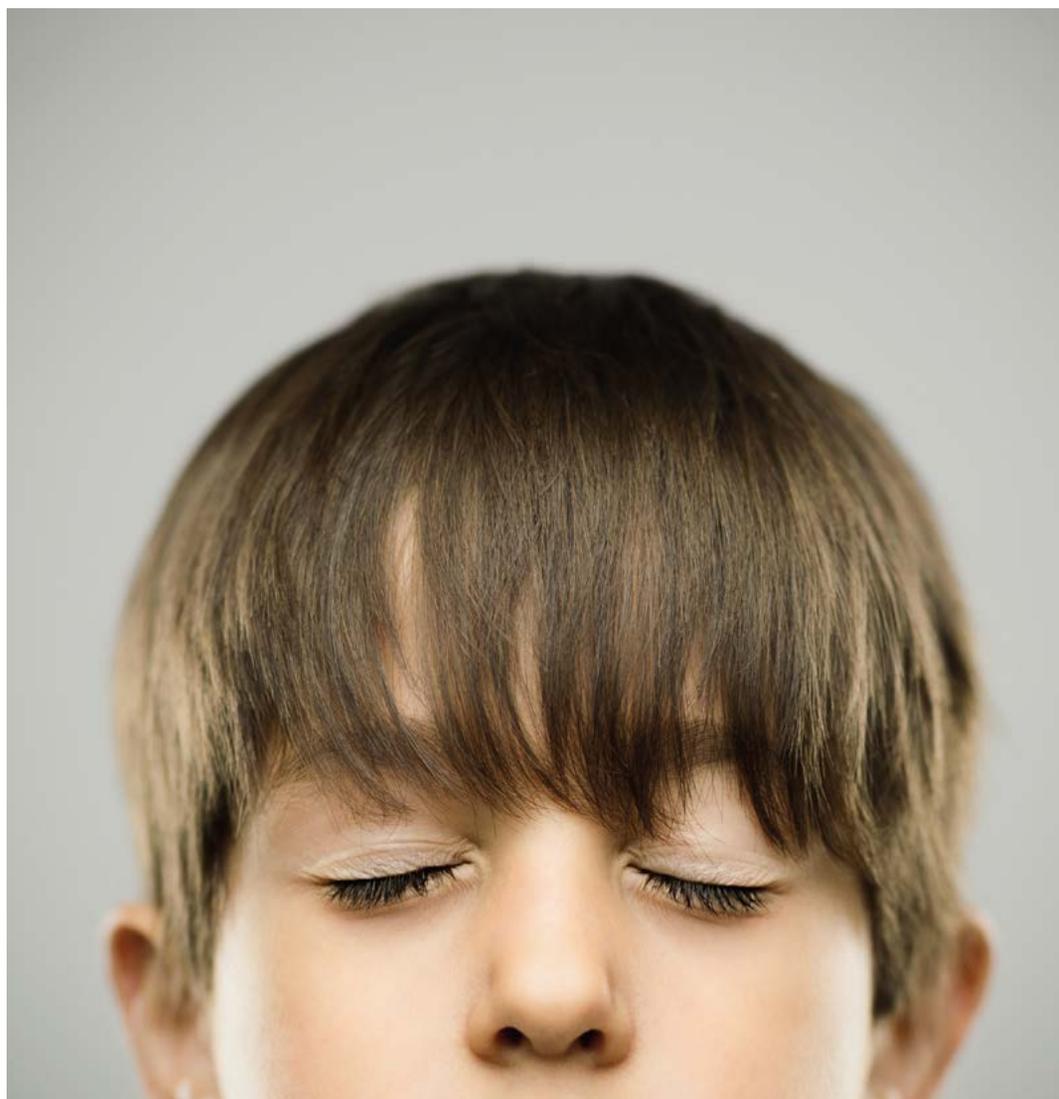
7 / ADVANCED METHODS IN COGNITIVE NEUROSCIENCE

Developing and refining new brain imaging methods and techniques is critical to addressing outstanding scientific questions on brain function and structure. Methodological advances are crucial not only for answering specific research questions, but also because they can boost the transfer and application of knowledge and improve medical and educational outcomes. We conduct new research in four main directions: novel procedures for cleaning data; empowering data analyses by employing advanced signal processing and machine learning techniques; quantification of fMRI activation patterns; and developing innovative neurofeedback EEG and fMRI protocols.

We investigate novel procedures for cleaning data as part of the fMRI preprocessing pipeline. We are developing new denoising algorithms that utilize the phase of the complex MRI signal to reduce the contribution from large vessels, thus improving localization of the origin of neuronal activity and accounting for potential confounding vascular effects. This is particularly relevant in the case of brain tumours and stroke which lead to alterations in neurovascular coupling. Furthermore, we are implementing new signal processing algorithms based on tensor decomposition and low rank methods for multi-echo fMRI acquisitions that improve the separation of neurobiologically relevant signal fluctuations from systematic artefacts and physiological noise. These algorithms are based on principles grounded in physics and physiology.

We empower data analyses by employing advanced signal processing and machine learning techniques. We explore new ways to investigate the interactions between brain regions using functional or effective connectivity methods based on time-frequency resolved measures, in the case of electrophysiological data, or based on the neuronal-related signals underlying hemodynamic fluctuations after deconvolution, in the case of fMRI data. In addition, we are developing new tools based on advanced machine learning algorithms, such as neural networks and sparsity-based statistical methods, for the purpose of multivariate spatio-temporal classification and exploration of brain imaging data. In addition, we also are formulating new techniques to investigate brain function while subjects are involved in experiments on human verbal communication in hyperscanning sessions. These techniques are based on the entrainment of electrophysiological signals in M/EEG or the synchrony of hemodynamic signals in fMRI or fNIRS.

We pursue research on the quantification of functional brain activation patterns. Going beyond conventional fMRI methods, which generally aim to map brain activity without using quantifiable units, we are designing new MR pulse sequences and implementing novel paradigms for calibrated fMRI that can obtain accurate quantifiable estimates for the cerebral metabolic rate of oxygen (CMRO2), a closer proxy of the metabolic processes associated with neuronal activation, from simultaneous acquisition of arterial spin labelling (i.e. cerebral blood flow) and blood-oxygenated level-dependent (BOLD) data.

Finally, we are implementing innovative neurofeedback EEG and fMRI protocols as a tool to improve learning, plasticity and language abilities (e.g. speech intelligibility). We explore neural entrainment from EEG data and decoding from real-time fMRI data, with a view to giving participants brain-related feedback that will help them promote the requisite brain states.

EUROPEAN RESEARCH COUNCIL (ERC)

01. ERC Advanced Grant (Programme IDEAS), ERC–2011 –ADG–295362, BILITERACY, PI Manuel Carreiras, Budget: 2.487.000€ from 01/05/12-30/04/17.

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02. ERC Advanced Grant (Programme IDEAS), ERC-2015-AdG_692502, L2STAT, PI Ram Frost, Budget: 850.000€ from 01/07/16-30/06/21.

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03. ERC Proof of Concept, ERC-2017-PoC_5-09-2017 Oscilang, PI Manuel Carreiras, Budget 150.000€ from 01/10/2018 -31/03/2020.

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04. ERC Consolidator Grant, ERC-CoG-2018-819093 READCALIBRATION, PI C. Martin, 1.875.000€

NATIONAL FUNDING MINISTERIO DE CIENCIA E INNOVACIÓN, ECONOMÍA Y COMPETITIVIDAD

01. SEV-2015-0490, Plan Investigación BCBL, PI Manuel Carreiras, Budget: 4.000.000€, 01/2016-12/2019

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02. PSI2014-53277-P, ACTIVACION LEXICA DE PALABRAS DENTRO DE OTRAS PALABRAS, PI Arthur Samuel; 68.728€, 01/2015-12/2017

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03. PSI2014- 53346-P, CARACTERIZACION NEUROANATOMICA Y NEUROFISIOLOGICA DEL SINDROME DE DRAVET, PI Doug Davidson & Alejandro Pérez, Budget: 73.810€, 01/2015-12/2017

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04. PSI2014-53351-P, MATEMATICA BILINGUE: DEL LENGUAJE A LA MAGNITUD, PI Elena Salillas, Budget: 46.185€, 01/2015-12/2017

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05. PSI 2014-54500-P, ELABORACION DEL ACENTO NON-NATIVO DEL PARLANTE EN EL HABLA, PI Clara Martin & Sendy Caffarra, Budget: 79.981€, 01/2015-12/2017

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06. PSI2014-54512-P, CORRELATOS NEURALES Y FISIOLOGICOS DEL DESARROLLO DE LA ATENCION EN BEBES MONOLINGUES Y BILINGUES, PI Monika Molnar, Budget: 72.500€, 01/2015-12/2017

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07. APCIN_2015_061 MULTILATERAL, PI Manuel Carreiras, Budget: 231.000€, 01/2016-12/2018

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08. PSI2015-73408-JIN, REVERSALA, PI Loretxu BERGOUIGNAN, Budget: 134,310€, 01/2017-1/2019

09. PSI2015-65694-P PreProc, PI Nicola Molinaro, Budget: 88.209€, 01/2016-12/2018

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10. PSI2015-65696-P MAGNO, PI Kepa Paz-Alonso, Budget: 87.967€, 01/2016-2/2018

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11. PSI2015-65689-P MIXLEARN, PI Jon Andoni Duñabeitia, Budget: 64.251€, 01/2016-12/2018

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12. PSI2015-65338-P DICHOBIL, PI Marie Lallier, Budget: 64.009€, 01/2016-12/2018

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13. PSI2015-67353-R Readeaf, PI Manuel Carreiras, Budget: 108.900€, 01/2016-12/2018

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14. PSI 2016-76435-P SIGNEVAL, PIs Brendan Costello & Marcel Giezen, Budget: 84,700€, 01/2017-12/2019

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15. PSI 2016-76443-P METAWARE, PI David Soto, Budget: 58,080€, 01/2017-12/2019

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16. PSI 2016-77175-P SPEECHDEGEN, PI Mathieu Bourguignon, Budget: 87,725€, 01/2017-12/2019

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17. FFI2016-76432-P LAMPT, PIs Simona Mancini & Leona Polyanskaya, Budget: 54,450€, 01/2017-12/2019

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18. PSI2016-81881 APLICACIONES CLINICAS DE LA NEUROIMAGEN FUNCIONAL, PI Manuel Carreiras, Budget: 20,000€, 01/2017-12/2019

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19. PSI2017-82563-P COLAPOP, PI Arthur Samuel, Budget: 97,768€, 01/2018-12/2020

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20. PSI2017-82941-P REFO, PI Clara Martin, Budget: 98,373€, 01/2018-12/2020

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21. ERC2018-Consolidator- ESTUDIO TRANSVERSAL Y TRANSLINGÜÍSTICO DE LA RECALIBRACIÓN FONÉMICA DURANTE LA ADQUISICIÓN DE LA LECTURA, PI Clara Martin, Budget: 75.000€, 12/18-11/19

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22. PGC2018-093408-B-I00 THALANG, PI P. Paz- Alonso, 84.700€, 2019-2021

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23. PGC2018-093474-A-I00 OSC-PAD, PI C. Richter, 90.750€, 2019-2020

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24. RTI2018-093547-B-I00 LANGCONN, PI M. Carreiras & I. Quiñones, 169.400€, 2019-2021

25. RTI2018-096216-A-I00 MEGLIOMA, PI L. Amoruso, 72.600€, 2019-2021

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26. RTI2018-096242-B-I00 VISOSCIL, PI M. Lallier, 72.600€, 2019-2021

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27. RTI2018-096311-B-I00 TRAINSYNCHRO, PI N. Molinaro, 171.336€, 2019-2021

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28. RTI2018-098317-B-I00 BILMETACOG, PI M. Ordin, 84.700€, 2019-2021

GOBIERNO VASCO
EUSKO JAURLARITZA

01. PI_2015-1_25 COPA: Como el Oyente Procesa el Acento, PI Clara Martin y Sendy Caffarra, Budget: 42,181€

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02. PI 2016-1-12 ATLAS MULTIMODAL DE NÚCLEOS TALÁMICOS Y SU APLICACIÓN AL ESTUDIO DE LA DISLEXIA, PI Kepa Paz-Alonso, Budget: 55,791€

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03. PI 2016-1-14 MARCADORES NEUROBIOLÓGICOS PARA EL DIAGNÓSTICO DE LOS TRANSTORNOS DEL DESARROLLO DEL LENGUAJE, PI Nicola Molinaro, Budget: 57,260€

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04. PI 2017-1-25 LA INTERACCIÓN ENTRE LA MEMORIA OPERATIVA Y LA ATENCIÓN VISUAL A LO LARGO DEL CICLO VITAL, PI David Soto, Budget: 69,600€

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05. ELKARTEK KK-201700103 NEUROMOD: SISTEMA DE NEUROMODULACIÓN EN LAZO CERRADO PARA LA MEJORA DEL SUEÑO Y LA MEMORIA BASADO EN LA REGENERACIÓN Y MANIPULACIÓN NEURONAL , PI Manuel Carreiras, Budget: 56,569€

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06. PIBA 2018-29 PRAD: PHONEMIC RECALIBRATION IN AVERAGE READER AND DYSLEXIC CHILDREN, PI Clara Martin, Budget: 50.000€

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07. PI2019-54, PI M. Kalashnikova, 43.395€, 2019-2020

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08. PI2019-104, PI C. Caballero, 48.912€, 2019-2020

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09. PIBA-2020-1-0024, PI S. Mancini, 48.340€, 2020-2022

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10. EXP.(2020/01203) (A720200352) DIRECT GRANT TO DEVELOP THE TRANSFER PROJECT: AWAKE PATIENT, SURGERY ON ELOQUENT AREAS, 200.000€, 2020

IKERBASQUE

01. Support for Tech-Transfer activities: Agreement to launch the NeureSoft diagnosis package. 200.000€, 2018-2019.

DIPUTACIÓN FORAL GIPUZKOA

01. Funded by GIPUZKOA GOVERNMENT, RED Programme, Grants No: 1. Grantees: Jon Andoni Duñabeitia, 2016-CIEN-000061-01 Architecture of the bilingual Brain, Oct. 2016-Sept. 2017. Budget: 36.000€

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02. Funded by GIPUZKOA GOVERNMENT, RED Programme, Grants No: 1. Grantees: Marie Lallier, MARCADORES NEUROBIOLÓGICOS PARA EL DIAGNÓSTICO DEL TRANSTORNO ESPECÍFICO DEL LENGUAJE (TEL) EN NIÑOS BILINGÜES, Sept. 2017-Sept. 2018. Budget: 25,620€

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03. Funded by GIPUZKOA GOVERNMENT, RED Programme, Grants No: 1. Grantees: Simona Mancini, ASC.ESP AFASIA: SCREENING COGNITIVO PARA EL ESPAÑOL UNIFICANDO PERSPECTIVAS CLÍNICAS Y NEUROCIENTÍFICAS, Octubre 2018-Sept. 2019. Budget: 39,410€

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04. Funded by GIPUZKOA GOVERNMENT, ADINBERRI Programme, Grants No: 1. Grantees: Kepa Paz-Alonso. ENTRENAMIENTO DE CAPACIDADES COGNITIVAS SUPERIORES EN MAYORES: EFECTOS CONDUCTUALES Y BASES CEREBRALES, Octubre 2018-Septiembre 2019, Budget: 83.434€

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05. Funded by GIPUZKOA GOVERNMENT, TALENTO Programme, Grants No: 2. Grantees: BCBL. GARAPEN, Octubre 2018-Septiembre 2019, Budget: 16.000€; EMPLOYER BRANDING, Octubre 2018-Septiembre 2019. Budget: 7.300€

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06. Funded by GIPUZKOA GOVERNMENT, RED Programme, Grants No: 1. Grantees: Ileana Quiñones, Cesar Caballero. TENDIENDO PUENTES ENTRE LAS NEUROCIENCIAS Y LA NEUROCIRUGÍA: MAPEO DE ÁREAS ELOCUENTES EN PACIENTES CON TUMORES CEREBRALES, Octubre 2019-Sept. 2020. Budget: 29,240€

INTERNATIONAL FUNDED PROJECTS & GRANTS

01. Funded by Qatar Foundation, NPRP 6-378-5-035 Learning to read in two alphabets: typical development and reading disorders, PI Manuel Carreiras 01/04/2014 - 31/05/2017, Budget: 362.160€

PRIVATE FUNDING

01. Funded by BBVA, Grants No: 1. Grantees: Jon Andoni Duñabeitia, "Brain Changes Associated with adult literacy", Oct. 2016-Mar. 2018, Budget: 34,000€

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02. Funded by BBVA, Grants No: 1. Grantees: Simona Mancini, "ACS.esp: screening de la afasia en español", Oct. 2018-Apr. 2020, Budget: 35.000€

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03. Funded by LA CAIXA FOUNDATION, HEALTH RESEARCH, Grants No: 1. Grantees: Manuel Carreiras, "Dyslexia and the thalamus: Integrating anatomy and function in a mechanistic account of the reading brain; HR18-00178", Dec. 2019-Nov. 2022, Budget: 500.000€

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04. Funded by TATIANA PÉREZ DE GUZMÁN EL BUENO FOUNDATION, Grants No: 1. Grantees: Kepa Paz-Alonso, "Dislexia e interacciones tálamocorticales: Una visión mecanística de la lectura basada en redes funcionales y estructurales", 2019- 2021, Budget: 47.850€

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05. NSF-National Science Foundation (USA), Award number 1749143, PI M. Carreiras, 72.055€

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06. Funded by FUNDACIÓN CIENTÍFICA AECC, Grants No: 1. Grantees: Manuel Carreiras, "Biomarcadores de recuperación cognitiva postquirúrgica en tumores cerebrales", 2020- 2023, Budget: 300.000€

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07. Funded by FUNDACIÓN KUTXABANK, Grants No: 1. Grantees: Miguel Arocena, "Herramientas diagnostico Dislexia en Euskera", 2019- 2021, Budget: 19.972€

PROJECTS BY THE
EUROPEAN COMMISSION
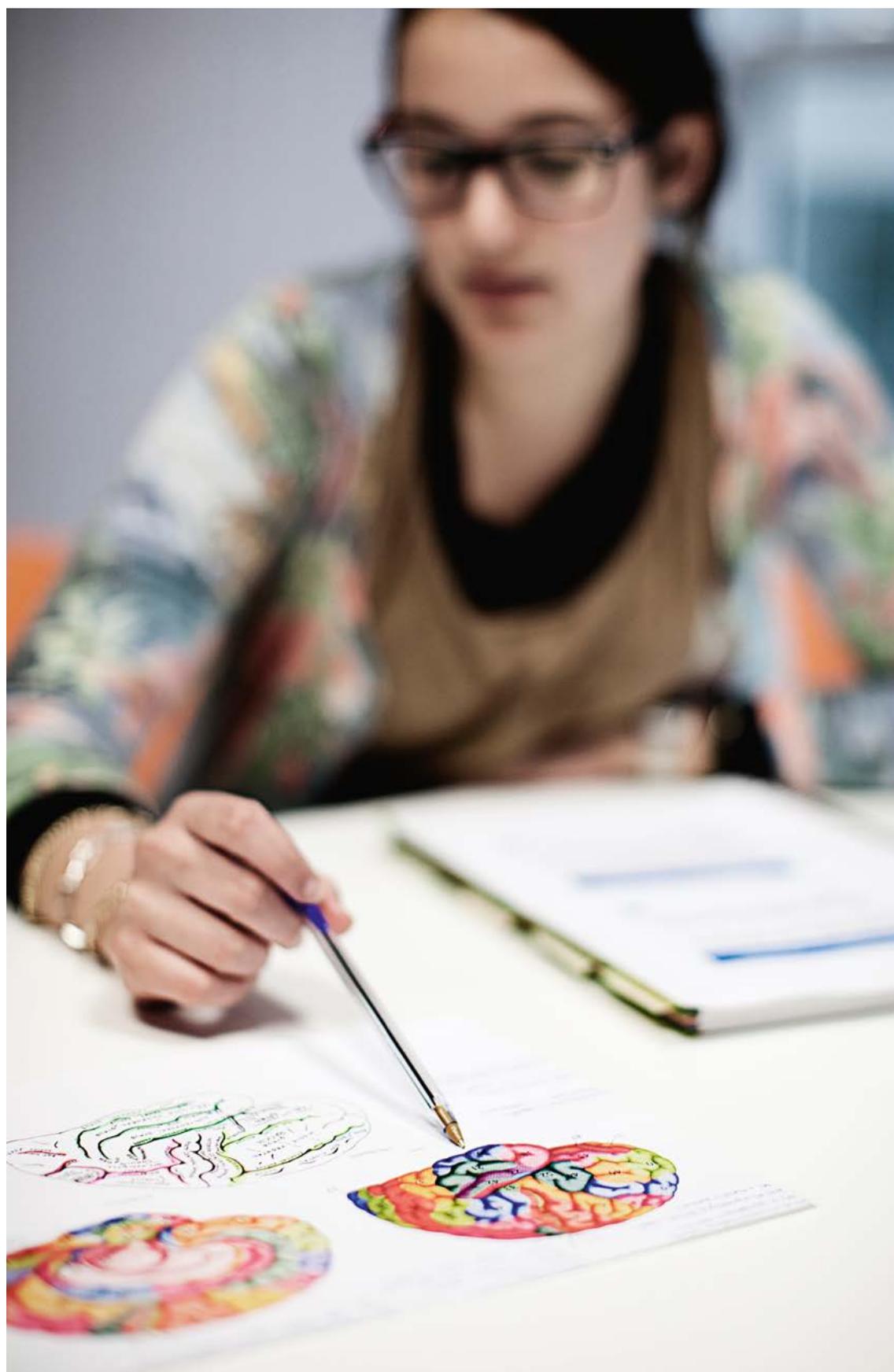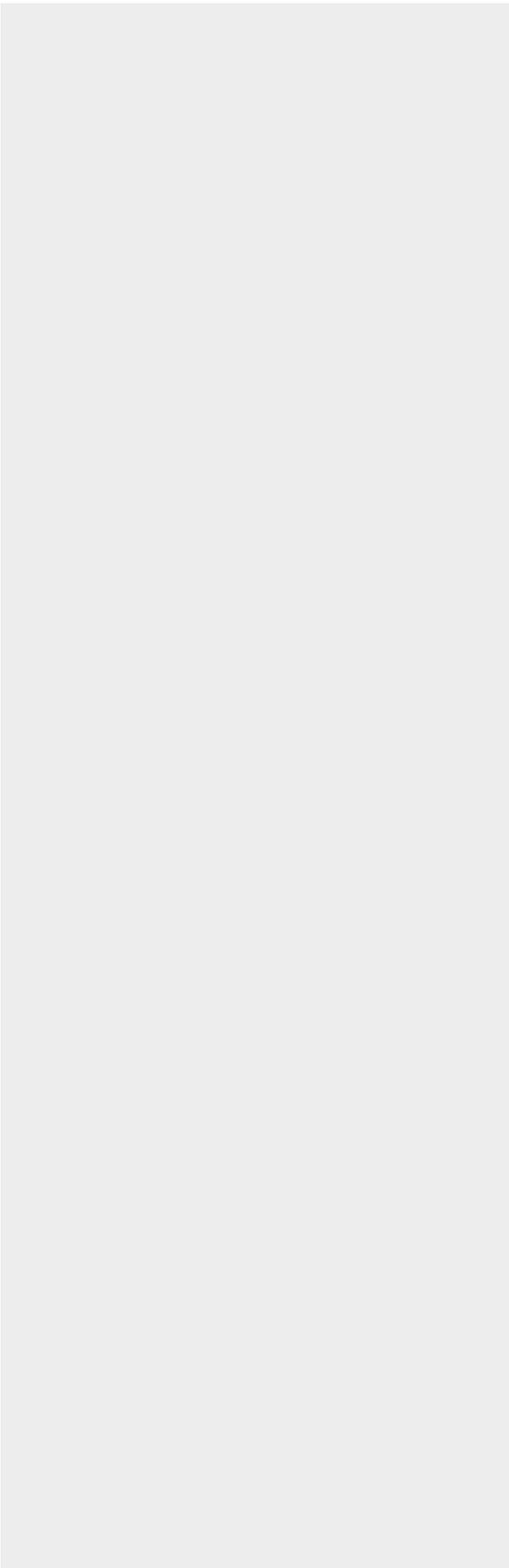
GA 295362 - BI-LITERACY:
LEARNING TO READ IN L1 AND IN L2

[Funding Agency
European Research Council

[Type of Project:
ERC Advanced Grant

[Time Frame:
2012 - 2017

[Budget:
€2,487,000

[Coordinator:
BCBL - PI Manuel Carreiras

Learning to read is probably one of the most exciting discoveries in our life. Acquiring this unique human cognitive ability not only opens a new world of opportunities, but also changes our brain (Carreiras et al., 2009). Further opportunities and additional brain changes also occur when learning to read in a second language. Using a longitudinal approach, the research proposed examines how the human brain responds to two major challenges. First, the challenge of instantiating a complex cognitive function for which there is no genetic blueprint (learning to read in a first language, L1), and second, the challenge of accommodating to new statistical regularities when learning to read in a second language (L2). The findings from this project will provide a deeper understanding of (a) how general neurocognitive factors and language specific factors underlie individual differences – and reading disabilities – in reading acquisition in L1 and in L2; (b) how the neuro-cognitive circuitry changes and brain mechanisms synchronize while instantiating reading in L1 and in L2; and (c) what the limitations and the extent of brain plasticity are in young readers. An interdisciplinary and multi-methodological approach is one of the keys to success of the present project, along with strong theory-driven investigation. By combining both we will generate breakthroughs to advance in our understanding of how literacy in L1 and in L2 is acquired and mastered. The research proposed will also lay the foundations for more applied investigations of best practice in teaching reading in first and subsequent languages, and devising intervention methods for reading disabilities.

4.B RESEARCH PROJECTS

GA 692502- L2STAT: STATISTICAL LEARNING AND L2 LITERACY ACQUISITION: TOWARDS A NEUROBIOLOGICAL THEORY OF ASSIMILATING NOVEL WRITING SYSTEMS

[Funding Agency
European Research Council

[Type of Project:
ERC Advanced Grant

[Time Frame:
2016 - 2021

[Budget:
€850,000

[Beneficiaries:
HUJI, BCBL

[Coordinator:
PI Ram Frost

The overarching goal of L2STAT is to understand L2 literacy acquisition by bringing together, for the first time, recent advances in the neurobiology of statistical learning (SL), a detailed statistical characterization of the world's writing systems, and neurally-plausible general principles of learning, representation, and processing. L2STAT aims to provide a new theoretical framework that considers L2 learning and SL a two-way street: SL, on the one hand, tunes learners to the regularities of a new linguistic environment, and on the other hand, L2 environment shapes learners' sensitivity to its specific types of statistical properties. The project will focus on the assimilation of reading skills in four novel linguistic environments, and investigate how exposure to their distinct writing systems shape, in turn, SL. L2STAT is an interdisciplinary project that launches in parallel five mutually informative research axes: 1) we employ advanced methods from computational linguistics and machine learning to precisely characterize the statistics of four highly contrasting writing systems (English, Spanish, Hebrew, Chinese). 2) We study the learning that results from biologically-inspired computational models that are exposed to these statistics, to generate a priori predictions regarding what statistical properties can (or cannot) be learned, and how neural mechanisms constrain the representations learned during L2 literacy acquisition. 3) We develop psychometrically reliable behavioral tests of individuals' capacities to extract regularities in the visual and auditory modalities. 4) We use state of the art neuroimaging techniques including EEG, MEG, fMRI to probe the neurobiological underpinning for detecting regularities in the visual and auditory modalities. 5) We conduct behavioral experimentation in four sites (Israel, Spain, Taiwan to track literacy acquisition longitudinally in the four different languages.

PROJECTS BY THE
EUROPEAN COMMISSION

**GA 787487 - OSCILANG: A
NEUROFEEDBACK SYSTEM BASED
ON OSCILLATORY ACTIVITY FOR
DIAGNOSIS AND INTERVENTION
IN LANGUAGE AND READING
IMPAIRMENTS**

[Funding Agency
European Research Council

[Type of Project:
ERC Proof of Concept

[Time Frame:
2018 - 2020

[Budget:
€150,000

[Coordinator:
BCBL - PI Manuel Carreiras

The goal of OsciLang is to provide an affordable, lightweight, wearable brain-computer-interface neurofeedback system that can facilitate the detection and treatment of language disorders such as dyslexia and specific language impairment (SLI). To date there is no established neurofeedback protocols for treating language or reading impairments. In essence, this tool will (a) diagnose/measure and (b) improve/rehabilitate an individual's ability to synchronize their brain's activity with changes in a speech signal. This novel type of neurofeedback, based on phase coherence of the neural oscillatory activity with speech, will allow us to detect and enhance language function. It capitalizes on our recent research on neural oscillations during speech processing, where we found reduced auditory tracking in delta band in dyslexic readers compared with controls, advocating impaired auditory processing in dyslexia. Thus, our work and related findings suggest that literacy skills in dyslexics will improve by means of neurofeedback training protocols that enhance brain-speech tracking capabilities, especially in noisy environments. OsciLang will help to sustainably enhance brain-speech synchronization strength by allowing participants to shape their neural activity while tracking speech. This will be accomplished by presenting participants with a simple and friendly interface that quantifies basic parameters of their brain activity in real time, measured via EEG.

This information can then be used by participants to facilitate top-down control on specific activation patterns. Based on our prior findings, OsciLang' algorithms will be monitoring phase coherence at theta and delta bands, an innovative approach that has yet to be implemented in a neurofeedback system. Oscilang will also lay the foundations for extending this novel approach to provide a general framework and technology for enhancing any individual's ability to learn to read.

**GA 819093- READCALIBRATION:
PHONEMIC REPRESENTATIONS
IN SPEECH PERCEPTION AND
PRODUCTION: RECALIBRATION BY
READING ACQUISITION**

[Funding Agency
European Research Council

[Type of Project:
ERC Consolidator Grant

[Time Frame:
2019 - 2024

[Budget:
€1,875,000

[Coordinator:
BCBL - PI Clara Martin

The main goal of this project is to demonstrate that reading acquisition (RA) drastically reshapes our phonemic inventory, and to investigate the time-course and fine-grained properties of this recalibration. The main innovative and groundbreaking aspect of this project is the merging of two research fields, (1) reading acquisition and (2) phonemic recalibration, together with a deep and extensive exploration of the (3) perception-production link, which results in a new research line that pushes the boundaries of our understanding of the complex interactions between auditory and visual language perception and production. We will demonstrate that phonemic representations (PRs) become more stable (less dispersed) during the process of learning to read, and that this recalibration varies according to the grapheme-phoneme conversion rules of the reading system. We will explore such recalibration by means of the first cross-linguistic longitudinal study examining the position and dispersion of PRs, both in perception and production of phonemes and words. Secondly, we will explore how recalibration develops when RA is impaired as is the case in dyslexic children –informing the research field on (4) dyslexia– and when pre-reading PRs are unstable as is the case in deaf children with cochlear implants –informing the research field on (5) deafness. Finally, the research will also be extended to PR recalibration during RA in a second language –informing the research on (6) bilingualism. This proposal provides the first systematic investigation of phonemic recalibration during literacy acquisition, and will provide important insight for pragmatic research and theoretical accounts of language perception and production and phonemic recalibration. This project will also have major implications for the clinical field (theories and remediation of dyslexia and deafness) and for social policies and education (bilingualism, spoken and written language teaching).

PROJECTS BY
THE SPANISH MINISTRY

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2017/2020

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SEV-2015-0490:
PLAN INVESTIGACIÓN BCBL

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2016 - 12/2019

[Budget:
€4.000.000

[Coordinator:
BCBL - PI Manuel Carreiras

In 2016, the BCBL obtained the
"Severo Ochoa" accreditation as center
of excellence in scientific research
awarded by the Ministry of Economy
and Competitiveness of the Spanish
Government.

This way, the BCBL joined the top group
of centers of excellence and shares
this position with 22 other research
centers, such as "Centro Nacional de
Investigaciones Cardiovasculares(CNIC)"
of Valentín Fuster, "Centro Nacional de
Investigaciones Oncológicas" (CNIO),
and "Instituto de Ciencias Matemáticas
(ICMAT)", among others.

The certification of excellence was
obtained in this call thanks to the scientific
results and strategic programs, after
a demanding evaluation in which 115
renowned researchers participated.

PSI 2014-53277-P LAWWW: LEXICAL ACTIVATION OF WORDS WITHIN OTHER WORDS

[**Funding Agency**
MINECO – Spanish Ministry for Economy and Competitiveness

[**Time Frame:**
01/2015 - 12/2017

[**Budget:**
€68,728

[**Coordinator:**
BCBL - PI Arthur Samuel
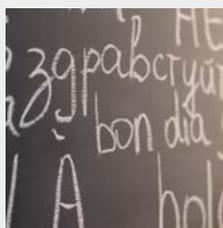
The proposed research will examine fundamental processes that underlie the ability of human beings to communicate naturally – with spoken language. As perhaps the most specifically human cognitive achievement, language can provide insights into how human cognition operates. After a half century of experimental study of spoken language, we know a great deal about how it works, but we also know that there is a great deal that remains to be learned. The current project will provide an extensive new set of information about how people understand spoken language.

The experiments will examine a phenomenon that is rampant in most languages: Longer words have shorter words embedded within them, presenting the word recognition system with a potentially major problem: How can it recognize the intended spoken word, when these other (unintended) words are also present in the speech signal? Recent work from our lab, using American English stimuli with American listeners, has identified three factors that appear to govern the degree to which this problem in fact results in lexical competition. In the first half of the project, we will greatly extend these recent findings: We will test the factors in two languages that are both quite different than English, and quite different from each other (Spanish and Basque). In addition to the experimental

procedure that was used in our previous work (auditory-auditory priming), we will employ a technique (the visual world paradigm) that offers a temporal analysis that is significantly better than what was available. A third technique (the long-term repetition paradigm) will provide information about whether encountering an embedded word leaves a lasting trace in memory.

In the second half of the project, we will extend these measures to spoken word recognition by bilinguals. Most of what is known of language processing comes from studies of monolinguals; yet with over 6000 languages spoken in about 200 countries, monolingualism is hardly the norm. In some regions of Spain, including the Basque Country, bilingualism is unquestionably the norm.

Collectively, the results will greatly enhance our understanding of the dynamic pattern of lexical activation that underlies spoken word recognition, both during listening in a person's native language, and during second-language listening.

PROJECTS BY
THE SPANISH MINISTRY

BCBL
ACTIVITY REPORT
2017/2020

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**PSI 2014-53346-P DRAVET:
NEUROANATOMICAL AND
NEUROPHYSIOLOGICAL
CHARACTERIZATION OF DRAVET'S
SYNDROME EPILEPSY**

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2015 - 12/2017

[Budget:
€73,810

[Coordinator:
BCBL - PI Doug Davidson

Dravet's syndrome is one of the few epileptic encephalopathies associated to the mutation of a specific gene: SCN1A, which encodes a subunit of the voltage gated sodium channel. It is a rare form of epilepsy that occurs in the first year of life (up to 15 months) and it is characterized by the onset of recurrent febrile and/or afebrile hemiclonic or generalized seizures in a previously healthy infant, followed by the appearance of multiple seizure types generally resistant to anti-epileptic drugs, with developmental arrest or regression. The evolution is insidious, with a significant mortality of up to 15% by 20 years. Neurological declines also occur in adulthood, with cognitive and motor deterioration.

The correlation between genotype and phenotype has become the SCN1A gene in one of the most relevant epilepsy genes today. A wave of research has been triggered spanning from animal models to human trials. Currently research on pharmacologic candidates for the treatment and the restoration of impaired c-aminobutyric acid (GABA) ergic neurotransmission is advancing at unprecedented speed. However, while the perspective of screening for appropriate drugs to be used in therapies is promising, the brain structural and functional counterparts of the common pathogenesis in DS have not been generally described until the recent study of our research group that described for first time the anatomical counterpart of DS in a quantitative way. Functional and structural traits related to the DS brain could provide extra criteria for diagnosis, as well as biological indicators for monitoring the progression of the condition, especially relevant in the follow-up of novel drug treatments. Based in the social need and the possible practical impact was our previous incursion on the topic. The present project proposal has been intended to continue this work given the unique opportunity of to have access to the DS community of Spain, the diverse skills of our group (EEG, MEG, MRI, see our publication record) and the technical support provided by our Center (BCBL).

In general, the project targeted a goal that could have significant positive implications for patients, family and health service. The practical benefits include a possibility of to better assess the impact of the antiepileptic drug choice, improved description of the patient state to optimize therapies/services, and allow parents to adjust their goals for the future.

4.B RESEARCH PROJECTS

**PSI 2014-53351-P L-MAG:
BILINGUAL MATH: FROM LANGUAGE
TO MAGNITUDE**

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2015 - 04/2017

[Budget:
€46,585

[Coordinator:
BCBL - PI Elena Salillas

The present project addresses the links between Language and Quantity, and it does so with a focus on Bilingualism. The management of two verbal codes to refer to the same magnitude in bilinguals offers an ideal window into possible modifications of number knowledge by numerical symbols. Our recent work suggests that one of the languages of a Bilingual has a preferred entrance to quantity and this language does not need to be the dominant language. Instead, language dominance for math is established during early learning: the language used for learning math (LLmath) will remain the dominant code and this code could or could not match the dominant language for general linguistic functioning.

This and other specificities guarantee the study of Bilingual Math in its own right. Thus the present project is a continuation of our recent line of research with an emphasis on the brain basis for the modifications in our numeric knowledge by LLmath. As a second goal, we will go deeper into the study of bilingual Developmental Dyscalculia (bDD). There are reasons to believe that bilingualism could impact the deficit, adding two non-equivalent verbal codes to an already defective numerical system. We address the development of verbal-quantity links, as well as the actual brain basis of this link in bDD. Our third goal implies a step into other quantity dimensions, such as time

or space, given the known commonalities in the processing of numerical quantity and these non-numerical dimensions. It is debated how numeric symbols could "recycle" in our ancient magnitude system. And here again bilingualism might be informative. It is our hypothesis that number symbols (Arabic or verbal) might enter our spatio-numerical knowledge through their intersections with numerical quantity. In bilingualism, similar asymmetries between codes should arise also during the processing of non-numerical magnitudes. We propose ways to test this both in healthy and DD populations. Importantly, we aim to address these questions at the behavioral and neurofunctional level, with the combined use of EEG/MEG techniques. They will provide with a spatiotemporal resolution lacking in the field of Numerical Cognition.

PROJECTS BY
THE SPANISH MINISTRY

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**PSI 2014-54500-P SNAP IN SPEECH:
SPEAKER'S NON-NATIVE ACCENT
PROCESSING IN SPEECH**

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2015 - 12/2017

[Budget:
€79,981

[Coordinator:
BCBL - PI Clara Martin

The goal of this project is to determine the impact of a non-native accent on speech comprehension. We will define how native listeners´ language comprehension is modulated when communicating with a non-native speaker. This conversational situation is highly frequent within the European Union. With the number of second language learners increasing drastically, the age at which people start to learn a second language lowering, and population movements being facilitated (9.7% of the total European Union population are foreign-born residents), most native listeners are interacting with second language or other non-native speakers on a daily basis. However, achieving native-like pronunciation is one of the most persistent difficulties for adult second language learners, so that even highly proficient non-native speakers often retain a "foreign" accent.

We will adress the experimental question in three linguistic domains: syntactic, semantic and world knowledge integration in accented speech. Within the syntactic domain, we will explore whether (and at which stage) native listeners overlook morphosyntactic violations produced by non-native speakers, and whether it depends on the familiarity of the error and/or the accent. Within the semantic domain, we will explore whether native listeners adjust their lexical-semantic processing of a critical word within a sentence,

depending on the speaker's accent. We will also further characterize the spatial localization of accented speech processing. Finally, within the domain of world knowledge integration, we will explore whether a non-native accent impacts the processing of sentences' truth value and credibility in native listeners.

As a whole, this project will provide critical pragmatic information on the influence of non-native accents in daily conversations, and crucial theoretical knowledge on the penetrability of the language comprehension system by external social cues such as the speaker's accent.

4.B RESEARCH PROJECTS

PSI 2014-54512-P ATTENTION BABY: NEURAL AND PHYSIOLOGOCAL CORRELATES OF ATTENTION DEVELOPMENT IN MONOLINGUAL AND BILINGUAL INFANTS

[**Funding Agency**
MINECO – Spanish Ministry for Economy and Competitiveness

[**Time Frame:**
01/205 - 12/2017

[**Budget:**
€18,150

[**Coordinator:**
BCBL - PI Monika Molnar

Monolingual and bilingual infants, despite the considerable differences in their linguistic inputs, follow the same developmental milestones in terms of language acquisition during the first year of life. What contributes to the learning success of bilingual infants? Our general hypothesis is that the human mind is capable of adjusting certain cognitive factors (e.g., attention resources) to perform necessary computations (e.g., linguistic computations) in an optimal way under different environmental circumstances (e.g. monolingual vs. bilingual learning context). Attention (e.g., orienting and sustaining fixation) is part of the earliest repertoire of the infant cognitive system. Because language acquisition begins even before birth, as infants are exposed to their native language(s) already in the uterus, it is a possibility that basic cognitive functions, including attention, develops differently across monolingual and bilingual infants to sufficiently support learning abilities. We propose that the differences in the early calibration of attentional networks should be reflected in differences in eye-movement activity at the saccadic level and brain activation in the right hemisphere across the two populations, because these functions are linked to attention. Importantly, these functions should also determine looking behavior (e.g., visual fixation duration). Recent studies have reported that bilingual and monolingual infants exhibit different looking behaviors in language tasks.

Here, we provide a neural/physiological explanation for the behavioral differences observed across monolingual and bilingual infants; in addition, we propose several experiments to assess whether attentional networks indeed develop differently across monolingual and bilingual infants in the first year of life. The findings will substantially contribute to the field of language acquisition and to our understanding of how the human mind develops.

PROJECTS BY
THE SPANISH MINISTRY

APCIN 2015-061 MULTILATERAL: MULTI-LEVEL INTEGRATIVE ANALYSIS OF BRAIN LATERALIZATION FOR LANGUAGE

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
12/2015 - 11/2018

[Budget:
€231,000

[Coordinator:
BCBL - PI Manuel Carreiras

Left-right lateralization is an important organizing principle of the human brain which is not a current focus of HBP (Human Brain Project) research. One prominently lateralized anatomical and functional network underlies the uniquely human ability to speak and understand language. A lack of brain lateralization has been associated with variation in human cognitive abilities important to language, and also with susceptibility to neurocognitive disorders including language impairment, dyslexia, autism and schizophrenia. The genetic basis of human brain lateralization is unknown, while links between lateralized anatomy and function are poorly understood. It is likely that genes involved in lateralization, both developmentally and during adult function, contain variants in the population that influence cognitive performance and neurocognitive disorders. We are generating transcriptomic data on lateralized gene expression in the embryonic and adult human brain. We recently identified, for the first time, sets of neuronal genes in the healthy adult brain that are expressed at different levels in the left and right temporal cerebral cortex (crucial for the language network). Here we propose a multi-level and integrated analysis of brain lateralization for language: I. Develop improved methods to reliably and automatically measure individual differences in lateralization of the language network in large numbers of participants, for anatomy, resting state intrinsic connectivity, and task-related

function. The language cortex is a variable region for which current automated methods do not perform optimally, yet automated methods are essential for achieving large datasets that are statistically powered for for genetic studies. It is essential to understand human brain diversity, as well as researching the 'average brain' which is the focus of most HBP activity. II. Apply the methods in brain imaging datasets having genetic data available, for the purposes of association and rare variant analysis followed by integrated genome-level analysis with transcriptomic (lateralized gene expression) data and genomic gene-set analysis. These combinatorial analyses go beyond standard genome-wide association scanning. Rather, the genomic data will be utilized to merge multiple genetic signals, informed by gene expression data and gene function data, in order to increase statistical power. III. Relate the gene sets arising from step II to human cognitive variability linked to reading and language, and susceptibility to neurocognitive disorders. Again, evidence-based combinations of genetic variants, constructed over many genes, will be investigated. Pinpointing shared genetic effects on lateralization and cognition would discriminate causal relations from mere correlation. Outcomes from this research program will include improved technology for automated analysis of large numbers of brain scans, and possible definition of susceptibility factors for important subtypes of impaired cognition.

4.B RESEARCH PROJECTS

PSI 2015-73408-JIN REVERSALA: REVERSING NEUROBIOLOGICAL TRAUMA AFFECTS WITH LANGUAGE

[**Funding Agency**
MINECO – Spanish Ministry for Economy and Competitiveness

[**Time Frame:**
01/2017 - 12/2019

[**Budget:**
€134,310

[**Coordinator:**
BCBL - PI Loretxu Bergouignan

Major depression and Post Traumatic Stress Disorder (PTSD) are inherently depending on life experience of acute stress. Decades of neuroscientific research are showing these psychopathologies share neurobiological mechanisms: Both population commonly show a smaller left posterior hippocampus and functionally affected medial cortical areas. Recent studies suggest more precisely the affection of the Dentate Gyrus (subpart of the hippocampus). The Dentate gyrus is the only region in the human brain to have adult neurogenesis.

Specific disturbances of neurogenesis functionality in the Dentate Gyrus, by stress and lack of coping to stress and recoveries with antidepressant or running are suggested by recent animal studies.

For the human brain neurobiological affection and potentiality of recovery abilities to stress related pathologies staies undisclosed. The positive outcome of therapies are reliably shown by clinical studies, with no clear undertsanding of the underpinning mechanism. A common feature of any therapy recommended for stress related disoders in particular is the reliving of the impactfull life experience via the narration outloud of the life event. Therapies based on the talking about traumatic experiences have shown the same, if not better, behavioral outcomes than antidepressent drugs for stress related

disorders (DSM V recommends such therapies for PTSD).

To answer these questions the project will include three main enterprises: First, after a behavioral analysis of the potential impact of language production on the episodic system, we will assess their neurodynamics and structural correlate. Second, to assess the potential underlying mechanism, the neuroimaging investigation on the emergence of conceptual knowledge from the striking life-experiences will be assessed. Finally, the process will be targetted specifically with trauma related life experiences, in a specific population that has experience physical life trauma (such as rape, or conjugal violence).

This project will thus disentangle the interaction of the neurobiology of language production with the episodic system, the potential mechanism underlying the working through of the life experience, the effect of language production outloud on distressful life events in a specific population with life-trauma, which will undertake the influence of cortisol, and hipothalamo pituitary axes, in the process. All three aims will include a specific neuroimaging structural assessment of the subparts of the hippocampus (as an indirect measure on the neurogenesis recovery hypothesis) with high resolution MRI, the structural connectivity with DTI, and the patterns of activity with fMRI.

PROJECTS BY
THE SPANISH MINISTRY

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**PSI 2015-65694-P PREPROC:
PREDICTIVE CODING AND PREDICTIVE
TIMING ACROSS MODALITIES AND
COGNITIVE DOMAINS**

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2016 - 12/2018

[Budget:
€88,209

[Coordinator:
BCBL - PI Nicola Molinaro

Much of our brain and mind activity focuses on the generation of predictions. The predictive coding framework offers a description of the implementation of such mechanisms both at the neural and cognitive level, offering an exciting possibility of furthering our understanding of the human nervous system, and its link to behavior. The main body of evidence for predictive processing however emerges from the literature on basic visual and auditory processing. Empirical evidence for such a proposal in the language domain is scarce, his extent of anticipatory mechanisms is still debated, and the central role of prediction during language comprehension has often been challenged. In order for predictive processing to provide a unified description of human cognition and action, it must also account for the uniquely human ability of language. One obstacle to doing so is the difficulty in applying findings from basic perceptual research to a complex stimulus such as language. Up till now, studies of non-linguistic stimuli have focused on two dimensions of the predictive process separately: predicting what (mainly in the visual literature) and predicting when (auditory research). Given the temporally dynamic nature of language, apprehending both dimensions simultaneously might be the key to understanding predictive processing in this domain. The goal of the present project is thus to evaluate the correlates of predictive processing focusing on the relation between predictive coding (what) and predictive timing (when) for the first time. We will study these two mechanisms across modalities (visual and auditory) and across domains (basic perception and language processing) to deconstruct the mechanisms supporting predictive processing. By using state-of the art brain imaging (MEG) and analysis techniques (estimation of neural rhythms at the brain level) the present project will contribute to the understanding of how top-down preparatory activity may be implemented by oscillating neural populations in detail and how it affects perception in primary sensory regions. In addition, identifying such an oscillatory "signature" of linguistic anticipatory processing may be used to re-analyze and re-interpret previous classical paradigms within the field of psycholinguistics, and to design more focused studies in the future.

4.B RESEARCH PROJECTS

PSI 2015-65696-P MAGNO: NEURODEVELOPMENT OF MAGNOCELLULAR AND PARVOCELLULAR VISUAL PATHWAYS AND THEIR CONTRIBUTION TO VISUAL RECOGNITION AND TYPICAL AND ATYPICAL READING

[**Funding Agency**
MINECO – Spanish Ministry for Economy and Competitiveness

[**Time Frame:**
01/2016 - 12/2018

[**Budget:**
€72,700

[**Coordinator:**
BCBL - PI Kepa Paz-Alonso

Visual recognition is a neccesary first step for many of the activities we performed on a daily basis. Identifying the pill we need to take, discriminating a familiar face in a crowd, and reading a novel are just examples of cognitive complex operations that require a refine engagement of our visual system. The magnocellular and parvocellular streams are the major visual pathways with different histologic and physiologic properties and specilization in regard to the stimuli they are oriented to. Although empirical evidence in humans regarding the invovelment of these visual pathways is limited, prior research in cognitive neuroscience and other related fields has underlined their potential contribution and differential implication to object recogntion evinced the differential involvement of these pathways in object recognion and in dyslexia. However, to date, we still do not yet the neurodevelopmental trajectories of these pathways and their specific contributions to visual recognition and typical and atypical reading. Here, we are aim to use behavioral researcn and multimodal structural and functional MRI indexes to 1) characterize the developmental trajectories of the contribution of manocellular and parvocellular visual pathways to object, face and letter strings recognition and to 2) investigate the involvement of these visual streams in typical and atypical single word and sentence reading, as well as their interaction with reading networks.

To this end, we will examine a total sample of 180 participants aged 8 to 25 in two separate studies (N = 80, Experiment 1; N = 100 Experiment 2) using behavioral, structural and functional MRI techniques. The proposed research project is unique in its exploration of the contribution fo the visual pathways to visual recognition and reading processes, and in the examination of the dynamic interplay between changes in brain structure, function, and behavioral outputs of typical and atypical developing groups.

PROJECTS BY
THE SPANISH MINISTRY

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**PSI 2015-65689-P MIXLEARN: THE
IMPACT OF MIXING LANGUAGES
DURING CONCEPT LEARNING**

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2016 - 12/2017

[Budget:
€64,251

[Coordinator:
BCBL - PI Jon Andoni Duñabeitia

When bilingual individuals are set in environments in which their two languages could be used, they constantly need to adjust their linguistic productions to the specific requirements of the contexts in order to use the appropriate language in each situation. This leads to complex settings that represent a challenge in bilingual communication, the biggest challenge being language switching. Its challenging aspect has been scientifically demonstrated in terms of the so-called switch costs. Namely, spontaneous and experimentally-driven language switches have been associated with a cognitive cost both in language perception and production, quantified both at the behavioral level (e.g., longer response latencies when switching) and at the neural level (in terms of stronger neural activations in the language control areas). Considering the 'negative' consequences of language switching (namely, the additional cognitive effort it requires and the cost it incurs), it is not entirely surprising that language mixing has been consistently avoided in circumstances in which effective transmission and acquisition of information is required, such as in the school system.

The current project endeavors to understand whether language mixing during different stages of the learning process should be avoided on the grounds of scientific evidence, or, alternatively, whether the use of the two languages spoken by a bilingual during teaching does not lead to poorer learning and worse concept acquisition and consolidation in spite of the cognitive cost required to overcome the impact of the language switches. We propose a research agenda that includes testing balanced and non-balanced bilinguals that are exposed to lab-based and more natural learning scenarios in which the transmission of the information is mediated either by written or oral language. These bilinguals will be tested in different periods of the process using not only behavioral measures, but also electrophysiological measures that can shed light on the way in which the acquired concepts have been integrated in the short-term memory and the long-term declarative memory. We will directly tackle the question of whether the learning mediated by two vehicular languages differs from that mediated by a single language, in both bilingual adults and children.

GOBIERNO
DE ESPAÑA

**PSI 2015-65338-P DICHOBIL:
DICHOTIC LISTENING: A WINDOW
ONTO BILINGUAL READING
DEVELOPMENT**

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2016 - 12/2018

[Budget:
€64,009

[Coordinator:
BCBL - PI Marie Lallier

Millions of children become literate in more than one language. However, we don't know whether learning two languages from early on helps or hinders children with reading disabilities, such as developmental dyslexia. Whereas the research agenda has always been largely monolingual-centered, we propose examining the effects of bilingualism on typical and atypical literacy acquisition and the related auditory phonological processes. Our rationale is that the language background of an individual will shape the development of inter-hemispheric connectivity that is crucial for phonological and reading development (from the right to the left hemisphere, Molinaro et al., Under review).

Previous evidence (Hull and Vaid, 2006, 2007) showed that, based on dichotic listening performance, early bilinguals process speech more bilaterally compared to late bilinguals and monolinguals, who present more strongly left-lateralized speech networks. In dichotic listening tasks, different speech stimuli are presented simultaneously to both ears, and a right ear advantage for reporting the stimuli reflects a left hemisphere specialization for language. Thus, early bilinguals would exhibit better left ear performance than late bilinguals and monolinguals, also reflecting stronger right-to-left inter-hemispheric communication.

In Study 1, early and late Spanish-Basque bilingual children as well as Spanish monolingual children will be assessed at the beginning of reading acquisition (Grade 1) and one year and a half later (middle of Grade 2). At each testing phase, phonological and reading skills will be assessed as well as dichotic listening performance indexing inter-hemispheric connectivity (left ear performance in particular). In Study 2, dyslexic and control early and late bilingual adults will be compared to monolinguals on inter-hemispheric connectivity behavioral (dichotic listening) and neural (functional connectivity of the oscillatory brain network responding to speech; structural and diffusion properties of the corpus callosum) measures.

We expect early bilinguals, compared to late bilinguals and monolinguals to show (i) an advantage on the left ear performance, (ii) stronger right-to-left inter-hemispheric connectivity measures, and (iii) more effective callosal connections. This would furthermore be linked to better phonological and reading abilities and reduced dyslexic symptoms.

Overall, this project will contribute to improving predictions of reading development and strengthen the foundations on which we can base monolingual and bilingual diagnostic tools and intervention programs.

PROJECTS BY
THE SPANISH MINISTRY

PSI 2015-67353-R READEAF: BRAIN MECHANISMS OF READING IN GOOD DEAF READERS

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
01/2016 - 12/2018

[Budget:
€108,900

[Coordinator:
BCBL - PI Manuel Carreiras

The (functional) illiteracy of the deaf is strikingly higher than that of their hearing peers. This state of affairs is unacceptable since it limits their access to information, and therefore their possibilities for exercising their rights in a modern society in which the printed word is essential. Learning to read represents a huge challenge for deaf children given their limited access to the sounds of language and to their incomplete knowledge of the language they learn to read in. However, some deaf individuals do become skilled readers. Previous research has focused on the difficulties of deaf readers in relation to phonological processing. In contrast, the present project focuses on the processes used by deaf skilled readers who have learnt to read in Spanish, a language with a transparent orthography. The skilled readers might activate visual, orthographic and semantic codes, but not phonological. To that end, we will investigate the cognitive processes and the neural circuit of skilled deaf readers, and also the flow of information in that circuit, by using MRI and MEG techniques. We will measure the brain activity and the functional and structural connectivity of the circuits used by skilled deaf readers during visual word recognition, with special attention to plasticity in the auditory cortex. We hypothesize that skilled deaf readers could show an earlier and faster activation of the visual, orthographic and semantic codes as compared to skilled hearing readers, and more direct connections between orthography and semantics. The results will help to gain a better understanding of the process of learning to read in deaf children, which is necessarily different to how hearing children learn to read. In addition, these results will be important for designing intervention programs to teach literacy to deaf children effectively.

4.B RESEARCH PROJECTS

PSI 2016-76435-P SIGNEVAL: TOWARDS THE DEVELOPMENT OF EVIDENCE-BASED ASSESSMENT TOOLS FOR SPANISH SIGN LANGUAGE

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
12/2016 - 12/2019

[Budget:
€84,700

[Coordinator:
BCBL - PI Marcel Giezen and Brendan Costello

This project will carry out the much needed groundwork required to develop evidence-based assessment tools for LSE (Spanish Sign Language). This involves (i) establishing resources that adequately describe the structure of the language and (ii) reaching a solid understanding of how the language is used and processed.

On the first count, one of the principal outcomes of this project will be the expansion of an existing lexical database to include information about specific properties of signs that are known to affect language processing: familiarity, iconicity and concreteness. Additionally, the phonological information already available in the database will be exploited to generate a metric of the distribution of phonological properties across the lexicon. This will provide information fundamental to the scientific study of LSE and will be instrumental for the design of future research work and assessment materials.

On the second count, this project focuses on how LSE is processed cognitively at both the lexical and the sentential levels. Specifically, we make use of the lexical properties added to the database (in the first part of the project) to investigate whether the processing of LSE is subject to the same lexical effects as those reported for spoken languages. Additionally, the project includes an MRI study that provides a detailed neuroanatomical profile of the lexical processing by deaf signers. At the sentence level, we focus on a unique property of sign languages, namely, the grammatical use of space. Firstly, we examine the interaction between basic word order and the use of space. Secondly, we aim to provide cognitive evidence to contribute to the ongoing debate about whether spatial inflection in sign language forms a single category.

PROJECTS BY
THE SPANISH MINISTRY

PSI 2016-76443-P METAWARE: BRAIN MECHANISMS FOR HUMAN WORKING MEMORY AND METACOGNITION ACROSS DIFFERENT STATES OF AWARENESS

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Type:
INITIAL TRAINING NETWORK, MARIE CURIE ACTION

[Time Frame:
12/2016 - 12/2019

[Budget:
€58,080

[Coordinator:
BCBL - PI David Soto

Conscious awareness allows us to introspect about our ongoing perceptions, thoughts, and actions, which can promote adaptive behaviour. Classically, working memory has been conceived as the process that allows for the maintenance and manipulation of information in the focus of the mind's eye to guide our behaviour towards relevant goals. Working memory is thought to be intimately related to our capacity to control and monitor the consequences of our behavioural responses, namely metacognition. Theoretical models of working memory and metacognition have typically assumed that these processes operate on information that is consciously experienced, in other words, that people has to be conscious of the relevant information so that it can be maintained in an active state for guiding ongoing behaviour. However, recent research, including work from my laboratory, has challenged the above conceptualisation of working memory and metacognition in its relation to conscious awareness. This recent research indicates that people can perform complex mental processes that require working memory even when they are not conscious of the critical information(e.g. reading, arithmetic, delayed discriminations, monitoring of performance, learning and subsequent recognition of a non-conscious sequence of events). Brain regions towards the front part of the head (i.e. the prefrontal cortex) have typically been associated with working memory, metacognition and awareness processes but emerging evidence from my laboratory suggests that, surprisingly, prefrontal brain regions can also be engaged in working memory processes independently of conscious awareness. The key aim of this project is to refine our understanding of the neurocognitive mechanisms that underlie the operation of working memory and metacognitive processes across different states of awareness of the relevant information, both in conscious and non-conscious contexts.

The present research proposal will also explore the role of experience and learning in modulating the ability of participants to use their working memory and their metacognitive insight in non-conscious contexts. The project will use cutting edge brain imaging techniques, multivariate pattern decoding analyses and seed-based functional connectivity analyses in order to characterize the computations carried out by prefrontal regions and delineate how the prefrontal cortex is engaged as part of a broader brain network to implement working memory and metacognitive processes in different states of awareness, namely, when observers are conscious and non-conscious of the relevant information. The use of brain imaging is fundamental for developing a theory of the operation of working memory and metacognition that is guided by what is already known about how the brain supports these functions. The outcome of the project will provide novel insight into the neural and psychological factors that mediate the operation of working memory and metacognition in relation to conscious awareness, which will lead to a novel conceptualization of how these cognitive systems operate. The outputs of this research have important implications for understanding the nature of human behaviour in both normal and abnormal populations.

**PSI 2016-77175-P SPEECHDEGEN:
WHAT KIND OF LISTENER ARE YOU? A
DEGENERACY APPROACH TO SPEECH
PROCESSING**

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
12/2016 - 12/2019

[Budget:
€87,725

[Coordinator:
BCBL - PI Mathieu Bourguignon

Speech communication is a major
component of human social interactions
and understanding its neural basis is of
paramount importance. Neuroimaging
techniques have improved our knowledge
of brain mechanisms subtending
speech processing but also led to many
contradictions. A potential reason for this
is that the brain might achieve complex
functions such as speech processing
in different ways. Therefore, different
subjects might use different strategies and
this could lead to inter-subject variability in
the recruited neuronal network and in the
neurophysiological mechanisms subtending
speech processing, leading as well to
variability in the ability to learn a new
language.

The present project aims to demonstrate
the existence of different brain strategies to
process incoming speech and characterize
these strategies in mono- and bilinguals.
The ultimate goal is to reconcile opposing
models of language processing by
introducing inter-individual variability, to
relate this variability to discrepancies in
the ability to learn a new language, and
to assess how bilingualism shapes this
variability. Mono- and bilingual subjects
will be taught new sound contrasts and
undergo speech listening tasks. Language
network will be mapped with fMRI and a
clustering approach will classify subjects
into separate groups so that activation
maps are similar within groups and

dissimilar between groups. MEG will
provide neurophysiological indices of
speech processing. These indices and few
behavioural parameters will be compared
between groups identified with fMRI.

We expect inter-group differences in
neurophysiological and behavioural
parameters, in line with the degeneracy
hypothesis of speech processing.
Identifying and characterizing the possible
strategies is of high importance to better
understand the origin of specific language
impairments, and to better understand the
mechanisms subserving language learning,
potentially leading to language trainings
tailored to each individual.

PROJECTS BY
THE SPANISH MINISTRY

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FFI2016-76432-P LAMPT: LANGUAGE ATOMS: AN INVESTIGATION OF MOOD, PERSON AND TENSE FEATURES

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
12/2016 - 12/2019

[Budget:
€54,450

[Coordinator:
BCBL - PI Simona Mancini

The study of features (i.e. descriptions of linguistic objects that permit capturing regularities within and across linguistic modules) is invaluable for both the theoretical and the experimental study of language, as features provide key notions for understanding and modeling natural languages. Previous studies have examined the question of how features are represented in the speaker's mind and accessed in the course of online processing, although the focus has been on grammatical gender and number. In the current project, we build on and contribute to this existing literature by investigating three different feature categories, person, tense and mood, which remain understudied in the psycho / neurolinguistic literature. Despite obvious differences in the type of information that these three features express, they have something in common: they all convey discourse related information concerning (i) the subject's speech participant role (in the case of person), the temporal frame under which an utterance is to be evaluated (in the case of tense), and the speaker's attitude or point of view with respect to the truth of a proposition (in the case of mood). The overarching goal of our project, which integrates linguistic theory and psyco /neurolinguistic approaches to language processing, is to examine the similarities and differences in how person, tense and mood dependencies are established in the course of online processing and how their interpretation relies on the interplay between lexical, inflectional, and discourse information, as suggested by recent theoretical proposals. By unveiling similarities and differences in the processing of these linguistic features, we will contribute to a better definition of the architecture of language and of the relation between grammar theories and language processing models. We will use two experimental techniques known for their high temporal resolution, event-related potentials (ERP, henceforth) and eye-tracking (ET) to gain insight into the time course of person, tense, and mood processing. Crucially, these two techniques complement each other in a unique way. ERP carries the potential to inform us of the qualitative nature of the mechanisms underlying the processing of these features, their similarities and differences. In turn, the tracking of eye movements can very precisely characterize the different stages involved in the establishment of the person, tense, and mood dependencies under examination. In the present project, we focus on feature processing in native speakers of Spanish, but we note that our findings can have great relevance for a number of distinct areas such as second-language (L2) learning and teaching, and the study of language pathologies.

4.B RESEARCH PROJECTS

PSI2016-81881 ACLIMAGEN: APLICACIONES CLÍNICAS DE LA NEUROIMAGEN FUNCIONAL

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

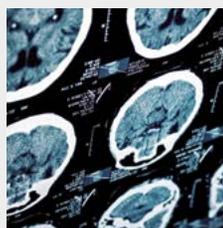**[Time Frame:**
01/2017 - 12/2019

[Budget:
€20,000

[Coordinator:
Universidad Complutense de Madrid-PI Fernando Maestu

[Partner:
BCBL - PI Manuel Carreiras

The identification of biomarkers for neuropsychiatric diseases is essential for the development of personalized clinical strategies. Functional neuroimaging can provide these biomarkers by means of non-invasive approaches. Especially, the study of the brain at rest, and, more specifically, the study of the default mode network (DMN), can provide these biomarkers due to the easy reproducibility of the conditions for the acquisition of this kind of data across different laboratories and the different pathologies in which DMN alterations have been described. However, the evaluation of the DMN can be performed using various technologies, such as electroencephalography, magnetoencephalography, functional magnetic resonance imaging or positron emission tomography, and these data are typically studied using a diversity of pre-processing and analysis protocols, making it difficult to obtain sufficiently consistent findings to allow the identification of valid and reliable neuroimaging biomarkers. This thematic network propose to bring together 9 research groups to address the standardization of data analysis strategies, the development of multimodal integration strategies for data collected by means of different neuroimaging techniques and the improvement of statistical methods to identify DMN-based biomarkers for different neuropsychiatric disorders. The network also aims to develop a training environment for the young researchers of the participating groups and promote the internationalization of the research they develop. Finally, we also propose to identify private sector organizations that may be interested in the objectives of this project and offer our collaboration in the development or improvement of their commercial products.

PROJECTS BY
THE SPANISH MINISTRY

BCBL
ACTIVITY REPORT
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PSI2017-82563-P COLAPOP:
CONTROL OF LEXICAL ACQUISITION:
PERCEPTION OR PRODUCTION

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2018 - 12/2020

[Budget:
€97,768

[Coordinator:
BCBL - PI Arthur Samuel

In acquiring a second language, or in growing a first language, learning a large number of words is essential. In fact, experts have quantified this need, and have indicated that learning the most frequent 2000 words of a language will work rather well for basic communication (Nation, 2001). The focus of the current project is the process of learning new spoken words. For example, all high school students in Spain learn English as a second (or third) language, and in this context must learn a large number of English words. In a typical beginning class, a great deal of time is spent with the teacher producing words, and with the students repeating those words, in order to build vocabulary. This approach is premised on the assumption that a good way to learn a word is to both hear it, and say it. Although this assumption seems obvious, a number of studies suggest that it may not be true. Under some circumstances, producing the to-be-learned word can actually disrupt the learning process.

We propose two sets of experiments. One set is grounded in a recent study by Zamuner et al. (2016), and the second set is based on research by Samuel and his colleagues (Baese-Berk, submitted; Baese-Berk & Samuel, 2016; Leach & Samuel, 2007). Zamuner et al. reported results that are consistent with the assumption that producing a word can help in learning a word, more than simply hearing the word

a second time. However, the production condition also presented the listeners with a more variable input set, and research on learning shows that such variability can often enhance learning. Thus, in one set of studies we will disentangle input variability and production to see whether producing the words actually helped the learners or not. The second set of studies in the current project builds on a number of previous studies that showed that developing rich mental representations of new words was disrupted when the learner produced the words, rather than just listening to them.

The results of the proposed research will clarify the relationship between spoken word perception and spoken word production, during the word learning process. This relationship had been a central theoretical issue in cognition, perception, and language for many years, and the systematic investigation proposed here will provide substantial new theoretical insights.

PSI2017-82941-P REFO: PHONEMIC RETUNING INDUCED BY READING ACQUISITION

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
01/2018 - 12/2020

[Budget:
€98,373

[Coordinator:
BCBL - PI Clara Martin

Learning to read changes the way one perceives spoken words and boosts performance in phonemic tasks. In fact, in expert readers, spoken words with inconsistent phonemes (i.e., phonemes that have many spellings) are recognized slower and less accurately than those with consistent phonemes (i.e., that have only one possible spelling; "orthographic consistency effect"). Plus, reading acquisition induces a boost in phonemic awareness (i.e., ability to distinguish and manipulate the minimal sounds of speech). Here, we make the claim that those consequences of reading acquisition (RA) can be explained by a unique and common phenomenon, which is the retuning of phonemic representations (PRs) by literacy acquisition. More specifically, we claim that (1) PRs (in perception and production) become more stable (less dispersed) when learning to read, accounting for the phonemic awareness boost during RA. We also argue that (2) this retuning varies with the consistency of the reading system (i.e., (in)consistency of phoneme-to-grapheme conversions), which would in turn explain the "orthographic consistency effect". We will explore such retuning by means of the first cross-linguistic study examining the position and dispersion of PRs, together with processing speed (both in perception and production of phonemes and words). We will compare Spanish and French adult readers on target phonemes that are shared by the two languages but that do not systematically follow the same phoneme-to-grapheme conversion rules (e.g., the phoneme /b/, consistent in French -always spelled 'b'- and inconsistent in Spanish -spelled 'b' or 'v'-). By comparing dyslexic adults with their matched controls, we will also test the hypothesis that (3) stabilization of PRs during RA is impaired in dyslexic patients. This proposal provides the first systematic investigation of phonemic retuning after literacy acquisition, which is highly relevant for the fields of language development and impaired reading acquisition, enabling better detection of risks of dyslexia and the creation of remediation tools. Spoken and written forms of new words will be taught sequentially or simultaneously. By this means, we aim to demonstrate that (4) both phonemic retuning and visual word form co-activation are at play in "consistency effects" in spoken word recognition (respective weights will be defined) and that (5) sequential acquisition of spoken and written word forms results in more stable PRs as compared to simultaneous acquisition. As a first step in extending this project to L2 acquisition, we will provide the first evidence of the (6) influence of L2 orthography during acquisition of L2 PRs. This project will make an essential contribution to pragmatic research and theoretical accounts of language processing, by revealing the origin of the "consistency effect" and by bringing to light important constrains for models on word recognition and production. It will also inform the adaptation of teaching strategies for novel word learning in native or foreign languages.

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ERC2018-092833 CROSS-SECTIONAL AND CROSS-LINGUISTIC STUDY OF PHONEMIC RECALIBRATION DURING READING ACQUISITION

[Funding Agency
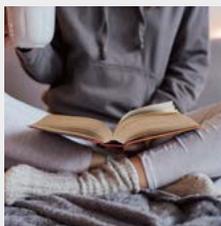MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
12/2018 - 11/2019

[Budget:
€75,000

[Coordinator:
BCBL - PI Clara Martin

The main goal of this project is to demonstrate that reading acquisition (RA) drastically reshapes our phonemic inventory, and to investigate the timecourse and fine-grained properties of this recalibration. The main innovative and ground-breaking aspect of this project is the merging of two research fields, (1) reading acquisition and (2) phonemic recalibration, together with a deep and extensive exploration of the (3) perception-production link, which results in a new research line that pushes the boundaries of our understanding of the complex interactions between auditory and visual language perception and production. We will demonstrate that phonemic representations (PRs) become more stable (less dispersed) during the process of learning to read, and that this recalibration varies according to the grapheme-phoneme conversion rules of the reading system. We will explore such recalibration by means of the first cross-sectional and cross-linguistic study examining the position and dispersion of PRs, both in perception and production of phonemes and words. This proposal provides the first systematic investigation of phonemic recalibration during literacy acquisition, and will provide important insight for pragmatic research and theoretical accounts of language perception and production and phonemic recalibration. Future extensions of this project will also have major implications for the clinical field (theories and remediation ofdyslexia and deafness) and for social policies and education (bilingualism, spoken and written language teaching).

PGC2018-093408-B-I00 THALANG: FUNCTIONAL AND STRUCTURAL CONTRIBUTIONS OF THE HUMAN THALAMUS TO LANGUAGE SYSTEMS ACROSS DEVELOPMENT

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
01/2019 - 12/2021

[Budget:
€84,700

[Coordinator:
BCBL - PI Kepa Paz-Alonso

Since the early 1960s, evidence from spontaneous and surgical lesions has pointed to the involvement of the human thalamic nuclei in language function. Several proposals have been put forward regarding a thalamic role in cognitive function in general, and language function in particular. However, to date, our understanding of the role of the thalamus in language function remains limited. The thalamus is a diencephalic structure with massive white matter fiber projections to almost the entire cerebral cortex. It is involved in the flow of sensory signals to the cortex and continues to contribute to the processing of information within cortical hierarchies. Among other functions, the thalamus is involved in the regulation of consciousness, sleep and alert states, the motor system, language, memory and attention, as well as in clinical conditions such as schizophrenia, Alzheimers disease and dyslexia. Recently, we developed the first probabilistic atlas of the human thalamic nuclei combining high-resolution ex vivo magnetic reasonance imaging (MRI) and histology, and have implemented a companion segmentation toolbox in the neuroimaging package FreeSurfer to support in vivo study of the thalamus and its subnuclei in MRI research. The proposed research project will capitalize on this tool, the well-known neuroanatomy of thalamocortical connections and the use of multimodal MRI techniques to investigate: 1) the developmental trajectories of the thalamic nuclei gray-matter volume and whitematter connections across the life span and their relation to individual differences in language-related variables; 2) the functional and structural involvement of specific thalamic nuclei and their thalamocortical interactions in language production, speech comprehension and reading in a large sample of young adults; 3) the functional and structural contributions of thalamocortical circuits to reading in typically-and atypically-developing samples with reference to some of the most important theories of reading and dyslexia. Thus, this research project aims to conduct a comprehensive multimodal investigation of thalamic contributions and thalamocortical interactions in language function within a neurocognitive, neuroanatomical and psycholinguistic framework. A key focus will be a better understanding how reading disabilities may occur as a consequence of breakdowns in thalamocortical circuits. In this regard, this project stands at the cutting edge of national and international research precisely tracking the role of the thalamus in language function, and will further allow the development of a mechanistic model of the contribution of the thalamic subnuclei and their interactions with cortical regions to central language systems.

PROJECTS BY
THE SPANISH MINISTRY

PGC2018-093474-A-I00 OSCILANG:
OSCILLATORY NETWORKS
UNDERLYING PREDICTION, ATTENTION
AND DYSFUNCTION IN DYSLEXIA

[Funding Agency
MINECO – Spanish Ministry for Economy
and Competitiveness

[Time Frame:
01/2019 - 12/2020

[Budget:
€90,750

[Coordinator:
BCBL - PI Craig Richter

The OSC-PAD project seeks to determine the electrophysiological correlates of predictive and attentional processing in hierarchical oscillatory networks. A key feature of the action is the comparison of network dynamics in healthy adults and participants suffering from developmental dyslexia. Cognitive and perceptual processing is subserved by a vast network of reciprocal neural connections between cortical areas. The topology of these ascending and descending connections defines cortical hierarchies. Recent evidence indicates that cortical oscillations conform to this anatomical hierarchy, with feedforward gamma frequency oscillations carrying ascending information from the environment, while oscillations in the alpha/beta band carry top-down information. Top-down signals have been shown to play a critical role in spatial attention, and are hypothesized to be involved in the online prediction of visuo-spatio-temporal stimuli. Central objectives of the OSC-PAD project are to 1) critically evaluate prevailing computational models that posit feedforward gamma, and topdown alpha/ beta oscillatory interactions as a substrate of predictive coding, and 2) to evaluate the interplay between attentional and predictive processing, a topic of vigorous debate, in hierarchical oscillatory networks. Furthermore, accruing evidence suggests the presence of deficits in attentional and predictive processing in dyslexic populations that may be manifested in the visual modality. Thus, another central aim is to establish predictive and attentional differences in hierarchical oscillatory network dynamics between the baseline results of healthy adults, and those of a dyslexic population. Using a novel visuo- spatial paradigm, and a cutting-edge magnetoencephalography processing pipeline, the project aims to assess state-of-the- art hypotheses on the forefront of fundamental and clinical cognitive neuroscience.

4.B RESEARCH PROJECTS

RTI2018-093547-B-I00 LANGCONN: IS THE BRAIN CONNECTOME A GOOD PREDICTOR FOR THE LANGUAGE NETWORK FUNCTIONAL MALLEABILITY?

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
01/2019 - 12/2021

[Budget:
€169,400

[Coordinator:
BCBL - PI Manuel Carreiras and Ileana Quiñones

The current project introduces a novel multivariate network-based approach where the combination of functional and structural measures will allow us to characterize the language connectivity fingerprints (i.e., connectome) taking also into account its intrinsic individual variability. Using this pioneering approach, we will characterize the connectome underlying the decoding and integration of linguistic signals and determine whether this connectome could be used to predict individual differences in language performance. For the first time, structural and language-related functional measures will be collected on the same participants across different language-specific tasks (i.e., comprehension and production) in two different languages (i.e., Spanish-L1 and Basque-L2). After the definition and characterization of the language connectome, it will be possible to investigate the capacity of this system to react when a salient language-related event occurs. The location of Donostia-San Sebastian, where the BCBL is situated, and the work relationship established between our institution and the Hospital Universitario Cruces in Bilbao, offers a unique opportunity to address this question. The Basque Country holds a Spanish-Basque bilingual population where it is possible to test people with different linguistic profiles. Thus, here at the BCBL, we have access to two different populations where neural plasticity seems to be a remarkable feature in terms of neural adaptability: (1) adults second language learners and (2) pre-surgical patients with low-grade gliomas affecting perisylvian areas involved in the processing of linguistic signals. While the first group allows us to investigate neural plasticity associated with the acquisition of new language-specific knowledge in a healthy and functionally typical brain, the second group of participants enables us to study the neural capacity to negotiate L1 and L2 language information after the removal of a critical language-related area. In summary, our primary goal is to determine to what extent the language connectome could be used to predict plastic changes associated with language-related salient events. Thus, in order to test the predictability power of the language connectome, we propose a longitudinal approach where both adults L2 learners and pre-surgical patients will be recorded before and after the occurrence of the critical event. Specifically, L2 learners will be recorded before and after they learn to read/speak in a second language, and the pre-surgical patients will be tested before and six months after brain surgery. By longitudinally tracking individual profiles at both behavioral and neural levels, with a special focus on changes in the network topology and dynamics, it is possible to bridge the gap between language functions, bilingualism and brain plasticity.

PROJECTS BY
THE SPANISH MINISTRY

GOBIERNO DE ESPAÑA

RTI2018-096216-A-I00 MEGLIOMA: OSCILLATORY MARKERS OF LANGUAGE PLASTICITY IN BRAIN TUMOR PATIENTS: A LONGITUDINAL MEG STUDY

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness
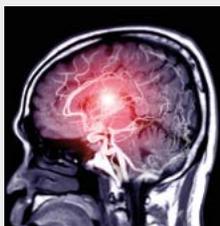
[Time Frame:
01/2019 - 12/2021

[Budget:
€72,600

[Coordinator:
BCBL - PI Lucia Amoruso

Recent evidence suggests that the presence of a brain lesion in close topographical relation with language-related areas triggers its functional reorganization. That is, by putting into play neuroplasticity mechanisms, the brain seeks to adapt and transfer linguistic functions from damaged to healthy areas adjacent to the lesion or contralateral to it. There is currently a considerable debate on the role of these mechanisms. For instance, while the recruitment of perilesional tissue is widely accepted as a marker of favourable outcome, the involvement of the right hemisphere is still controversial, with evidence either suggesting adaptive or maladaptive plasticity. In this context, our comprehension of language plasticity has been traditionally based on studies mapping brain function with hemodynamic techniques in stroke patients. However, this approach has certain limitations. On the one hand, due to its limited temporal resolution, hemodynamic techniques do not allow capturing the spectro-temporal activity associated with linguistic processing, which occurs in the millisecond timescale and involves specific brain rhythms. On the other hand, the sudden and acute nature of stroke lesions only allows studying compensatory mechanisms once brain damaged has occurred (i.e., post-stroke plasticity). Here, we will focus on very interesting and poorly studied population, namely, patients with low-grade gliomas (LGGs). Due to its slow growth (4mm per year), this type of tumors allows the brain to progressively adapt and transfer linguistic functions gradually without severe neurological symptoms. Thus, compensatory mechanisms can be traced once the tumor is removed through surgery but, most importantly, before its resection occurs, providing new insights into the brains capacity of maintaining homeostasis in the presence of a lesion. By implementing a longitudinal design that maps language function with magnetoencephalography (MEG) before and after surgery, this project aims at identifying biomarkers of neuroplasticity underlying successful compensation of linguistic abilities in patients with LGGs. Furthermore, a clinical aim of the project is to help neurosurgeons in planning the surgery strategy by means of the preoperatively mapping of eloquent areas with MEG and through the design of personalized behavioral tasks (e.g., based on the patient's linguistic profile). These tasks will be further combined with direct electrical stimulation (DES) during the on-line intra-operative phase of the surgery to remove the tumor according to functional boundaries. By doing so, we seek to overcome the existing fragmentation between basic and clinical research, in order to optimize the quality of tumor resection while minimizing the risk of post-operative neurological deficits, thus improving patient's well-being and quality of life.

RTI2018-096242-B-I00 VISOSCIL: DOES VISUAL OSCILLATORY ACTIVITY IN THE ALPHA BAND CONTRIBUTE TO TYPICAL AND ATYPICAL READING DEVELOPMENT? A FOCUS ON VISUAL ATTENTION

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
01/2019 - 12/2021

[Budget:
€72,600

[Coordinator:
BCBL - PI Marie Lallier

In most cases, developmental dyslexia, a specific deficit at learning to read, is associated with phonological auditory difficulties which are thought to explain grapheme-to-phoneme conversion deficits. However, symptoms of dyslexia are not always observed in presence of phonological deficits. To explain the potential origin of dyslexia in individuals that do not exhibit any phonological processing difficulties, the visual attention span (VA span) deficit hypothesis has been proposed (Bosse, Tainturier, & Valdois, 2007). In the present proposal, we will focus on refining the VA span deficit hypothesis from the novel perspective of neural and behavioural oscillatory processing. We will test the assmption that the origin of VA span deficits in dyslexia and the contribution of VA span skills to reading development possibly reside in neural alpha oscillations (8-12 Hz). In addition, we will test the proposal that cross-linguistic differences in letter-sound mappings regularity (the orthographic depth) modulates the strength of the VA span deficits in dyslexia and their visual oscillatory underpinnings. Firstly, we will determine whether the development of visual oscillatory activity/ processing contribute (longitudinally and cross-sectionally) to the development of VA span skills: we will compare two groups of Spanish-speaking children: one at the very early stages of reading acquisition (beginning of Grade 1) and one at the end of reading acquisition (Grade 5) to highlight the developmental dynamics of the association between VA span skills, visual oscillations and reading. Grade 1 children will be re-tested one year and a half later at the end of Grade 2 to study the longitudinal contribution of alpha oscillations to VA span and reading skills. Secondly, we will investigate whether impairments on alpha oscillatory visual mechanisms relate to dyslexia associated with a VA span deficit: we will compare the VA span skills, oscillatory skills and reading skills of dyslexic adults, to their chronological age-matched and reading age-matched skilled reader controls. Lastly, we will test the hypothesis that the strength of this oscillatory visual deficit in dyslexia is modulated by the orthographic depth of the language learned: we will compare the severity of VA span and alpha oscillatory impairments between French (deep orthography) and Spanish (shallow orthography) dyslexic adults. Overall, this project will contribute to explaining part of the current puzzling heterogeneity characterizing the visual manifestations of dyslexia, since it will consider the language learned as a potential source of this heterogeneity. The present project should have a strong impact not only on the neurocognitive models of reading but also on educational and health systems both for Spanish and French speaking communities. Lastly, we hope that the outcomes of this research will contribute to improving the management of dyslexia at the individual level by allowing practitioners to formulate more precise predictions on the expected symptoms.

PROJECTS BY
THE SPANISH MINISTRY

GOBIERNO DE ESPAÑA

RTI2018-096311-B-I00
TRAINSYNCHRO: WHY DOES
MUSICAL TRAINING ENHANCES
SPEECH PROCESSING? A CORTICAL
ENTRAINMENT PERSPECTIVE

[Funding Agency
MINECO – Spanish Ministry for
Economy and Competitiveness

[Time Frame:
01/2019 - 12/2021

[Budget:
€171,336

[Coordinator:
BCBL - PI Nicola Molinaro

Recent studies have shown that musicians outperform nonmusicians on a variety of tasks related to speech processing, suggesting that musical training may boost our ability to process auditory language. Yet, we know very little about the neurocognitive mechanisms underlying such musician advantage. On one hand, a several studies suggest that musical training enhances the sensitivity of the auditory pathways to sound in general. This would improve human acoustic skills that may in turn transfer to language acquisition and processing. On the other hand, it has been hypothesized that musical training might refine the interaction between motor and auditory regions. This in turn would boost the ability to develop regular and precise temporal predictions, utilizing more fine-tuned motor production plans of the spoken sounds. Understanding which is the driving force underlying the improved language performance in musicians is a topic of central interest in cognitive neuroscience, with inevitable implications for the development of intervention strategies for language acquisition and associated developmental disorders. This project aims at informing such applied research by uncovering the neural mechanisms underlying the musician advantage. To this purpose we will study auditory cortical entrainment in musicians and nonmusicians. Cortical entrainment refers to the ability of the brain to naturally synchronize its internal oscillatory activity with the rhythm of the external auditory signals. This phenomenon has been shown to play a pivotal role in the extrapolation of linguistic tokens from acoustic signals and in the construction of coherent auditory representations. Crucially, different components of this phenomenon have been linked to both passive auditory sensitivity (involving auditory regions) and active predictive timing (involving premotor regions). Comparing rhythmic auditory processing and cortical entrainment to speech and music in musician vs nonmusicians will provide us with a unique model to (1) evaluate the specific aspects of language processing that are enhanced by music training; (2) unveil the specific neurocognitive mechanisms underlying such improved performance; and (3) use the fundamental knowledge of (1) and (2) to define better treatment for intervention in language disorders.

4.B RESEARCH PROJECTS

RTI2018-098317-B-I00 BILMETACOG: THE EFFECT OF LINGUISTIC EXPERIENCE ON THE NEURAL MECHANISMS OF METACOGNITIVE PROCESSING IN NON-LINGUISTIC DOMAINS

[Funding Agency
MINECO – Spanish Ministry for Economy and Competitiveness

[Time Frame:
01/2019 - 12/2021

[Budget:
€84,700

[Coordinator:
BCBL - PI Mikhail Ordin

Despite the existence of many studies aimed at challenging or supporting the bilingual advantage in cognitive control, almost nothing has been done to explore the effect of bilingualism on metacognition, i.e., the ability to monitor ones own cognitive performance and the outcome of the cognitive processes across different task domains (linguistic and non-linguistic). Metacognitive processing may be influenced by the experience of a given individual in a specific domain. As bilinguals are have more experience with linguistic tasks (provided that their languages are typologically and phonetically different to trigger differences in speech and language processing when they switch languages), they might display improved metacognitive awareness in tasks that are linguistic in nature. Improved metacognitive performance is reflected in better error-detection and monitoring mechanism when performing tasks in the domain where an individual has more experience. However, the hypothesis that individual experience in a certain domain (e.g., in language processing) leads to enhanced metacognitive processing in this domain has not yet been explicitly tested. Moreover, there is no evidence that enhancement of metacognitive processing skills in one domain can be transferred to a different domain (e.g., from linguistic to onlinguistic), which would be the case if metacognitive processing in different domains relies on the same neural mechanisms in circuits. Building upon preliminary evidence presented in this proposal, this project will address for the first time how the bilingual experience and linguistic environment interact with metacognitive processing at both behavioral and neural levels. Within the framework of the proposed project, the following questions will be focused on: 1. How does bilingualism influence metacognitive sensitivity, metacognitive efficiency and metacognitive bias in performing linguistic and non-linguistic tasks in visual and auditory modalities? 2. Which brain circuits are involved in metacognitive processing in linguistic and non-linguistic tasks, and how they are affected by bilingualism and by the social linguistic environment? These issues will be addressed in a series of behavioral and EEG experiments followed by an fMRI study aimed at defining the brain networks and substrates involved into metacognitive processing. The results will show how individual differences in longterm experience affect these networks and modulate metacognitive processing.

PROJECTS BY
THE BASQUE GOVERNMENT

BCBL
ACTIVITY REPORT
2017/2020

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PI 2015-1-25 COPA: HOW THE LISTENER PROCESSES ACCENT

[**Funding Agency**
Basque Government

[**Time Frame:**
09/2015 - 12/2017

[**Budget:**
€42,181

[**Coordinator:**
BCBL - PI Clara Martin and Sendy Caffarra

The objective of this project is to define how language comprehension gets modulated in a native listener when communicating with a non-native speaker. This topic is of great importance, as native listeners have to interact everyday with non-native speakers of either a second or another language (around 9.7% of the total population of the European Union is composed of residents born in a foreign country.) Learning a pronunciation similar to the one of a native speaker is one of the biggest difficulties for adult students of a second language and, therefore, the majority of non-native speakers have a "foreign accent". This means that the verbal communication between native and non-native speakers is not only a problem for non-native speakers who have to convert messages into a second language (which has been the main focus of previous investigation in this field), but also for native interlocutors who have to process and understand speech with a strong accent. Therefore, to better understand how verbal communication works, we need to explore ways in which language gets influenced by the accent of a non-native interlocutor. We will achieve this by studying how fundamental aspects of sentence comprehension are modulated by accented speech.

On the other hand, foreign accented-speech will be used as a tool to explore language comprehension at a theoretical level. In the last 30 years, extensive knowledge has been acquired about the mechanisms of comprehension of oral language and its neural correlates but, despite this knowledge,

the automaticity of the steps in language processing is still subject of debate. Theoretically, it is important to identify which stages of language comprehension processing are automatic, controlled and socially adaptable, which means they can be modulated by external social signals. The present project will provide experimental evidence about the extent to which the different stages of language comprehension can be penetrated by social external signals (e.g. the speaker's accent) or, on the contrary, are automatic and invariant with respect to the characteristics of the speaker.

We will further analyze this experimental question in two linguistic domains: syntax and semantics. Within the syntactic domain, we will explore whether (and in which stage) native listeners disregard morphosyntax-violations produced by non-native speakers, and whether it depends on familiarity with the error and/or the accent. Within the semantic domain, we will study whether native listeners adjust their lexical-semantic processing of a critical word in a sentence, depending on the speaker's accent. Also, we will better characterize the spatial location of accent processing.

Overall, this project will provide critical pragmatic information about the influence of non-native accents in everyday conversations and the fundamental theoretical knowledge in the penetration of the comprehension system of external social signals, such as the speaker's accent.

PI 2016-1-12 MULTIMODAL ATLAS OF HUMAN THALAMIC NUCLEI AND ITS APPLICATION TO THE STUDY OF DYSLEXIA

[**Funding Agency**
Basque Government

[**Time Frame:**
01/2017 - 01/2019

[**Budget:**
€55,791

[**Coordinator:**
BCBL - PI Kepa Paz-Alonso

Research evivence has highlighted the critical role of the thalamus in language in general, and in reading in particular. Functional magnetic resonance imaging (fMRI) studies and neuroanatomical research have highlighted that the thalamus may play a fundamental role in the most prevalent language disorder in society: developmental dyslexia. However, at present, there are no detailed atlases of the thalamus that make it possible to discriminate in a highly reliable manner its different nuclei at the structural and functional levesl. Automatic analysis of MRI images of the thalamic nuclei requires software tools capable of analyzing images at much higher resolutions than those currently used in neuroimaging studies. In this project we propose to solve this problem through the construction of a high resolution atlas of the thalamus. To construct the atlas, we will use high-resolution MRI and histological images of brains from autopsies. Since these ex vivo samples do not show any movement, it is possible to perform MRI acquisition for long periods, obtaining images of very high resolution and a high signal-to-noise ratio. This level of detail in the images allows a neuroanatomist to manually label ("segment") the thalamic nuclei with high precision (Study I). Next, we will use Bayesian inference techniques to combine manual segmentations of ex vivo data with existing labels of the entire thalamus and its surrounding structures, with the aim of obtaining a complete atlas of thalamic nuclei and their environment (Study II) . To validate this atlas of the thalamus and its nuclei, we will examine to what extent it corresponds to previous segmentations using probabilistic tractography with an independent sample of 100 subjects (Study III). Finally, the atlas and the corresponding segmentation algorithms will be used to study the relationship between the thalamus and dyslexia. Previous studies have shown that, compared to normal subjects, individuals with dyslexia present deficiencies in the magnocellular layers of certain thalamic nuclei, as well as in their connections with the primary auditory and visual cortex (Study IV). Given that the tools we propose to create can analyze data at the nucleus level, they will allow us to study which nuclei and connections are affected in dyslexia, and therefore help us to better understand this neurobiological reading disorder. In addition, the atlas developed in this project will be freely distributed as part of the popular FreeSurfer neuroimaging package, allowing the more than 15,000 users around the world to carry out cognitive neuroscience experiments at the thalamic nucleus level, and opening the possibility of discovering new imaging biomarkers of both dyslexia and other pathologies related to the thalamus, such as multiple sclerosis, amyotrophic lateral sclerosis, and Alzheimer's and Parkinson's diseases.

PROJECTS BY
THE BASQUE GOVERNMENT

BCBL
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**PI 2016-1-14 NEUROBIOLOGICAL
MARKERS FOR THE DIAGNOSIS
OF DEVELOPMENTAL LANGUAGE
DISORDERS**

[Funding Agency
Basque Government

[Time Frame:
01/2017 - 01/2019

[Budget:
€57,260

[Coordinator:
BCBL - PI Nicola Molinaro

The present project focuses on studying the neurobiological indices of the brain (physiological and anatomical) that allow us to estimate the differences and similarities among individuals with various linguistic disorders: reading difficulties (dyslexia) and specific difficulties in oral language (production and/or comprehension): (Language Specific Language Impairment, SLI). To do so, we will study the typology of each impairment at the behavioral level and analyze the underlying bases at the structural and functional level of the brain in each case. The studies carried out using neuroimaging techniques (Magnetic Resonance, MR, and Magnetoencephalography, MEG) analyze the automatic brain response when processing different aspects of language, but do not require any linguistic task. Therefore, these neurobiological parameters can be acquired even in children at a very young age, who are even unable to read yet. Creating a direct connection between the behavioral impairment and the brain impairment will allow us to detect the impairment at an early developmental stage, when the behavior cannot yet be established (neonatal age). Thanks to this project we will be able to observe whether dyslexia and SLI share the same phonological impairments or differ in their characteristics. A critical aspect is the evaluation of neurobiological indices of SLI and dyslexia in bilingual children, a sample that has never been assessed up until now and that is highly represented in the Basque Country and in modern society in general.

PI 2017-1-25 INTERACTION BETWEEN WORKING MEMORY AND VISUAL ATTENTION ACROSS THE LIFESPAN

[Funding Agency
Basque Government

[Time Frame:
07/2017 - 10/2019

[Budget:
€69,600

[Coordinator:
BCBL - PI David Soto

Attention and working memory are fundamental psychological functions that help us to meet our behavioural goals. Attention allows us to pick up the most relevant information in the environment, while working memory enables us to maintain information active in the focus of our mind in order to guide behaviour. It is well established that ageing can lead to impairments in the brain mechanisms of attention and working memory, which might limit performance in everyday life activities (i.e. driving) and even be a sign of a risk of neurological disease such as in early dementias. Memory and attention functions, however, were normally investigated as separate psychological functions in previous studies, but they both are in fact closely inter-dependent as recent research from our laboratory has demonstrated. Think, for instance, of creating a mental image in order to find a pair of smart shoes that match the colour of your jacket or to remember a message to type in your mobile phone. These examples illustrate how active maintenance of memory contents (working memory) may be critical to direct behaviour. Nevertheless, the contents held in memory can also sometimes have unwanted or even detrimental consequences because our attention may be diverted by memory distracters. For instance, imagine that you are driving to the supermarket while mentally holding in memory a reminder to buy meat. Inadvertently, your attention may be drawn by a Burger King advertisement, at the expense of attending to the road, hence impairing performance in the relevant task (i.e. driving).

Without the capacity to balance/control the interaction between working memory and attention systems our behaviour would become highly inefficient (e.g. overlooking the presence of important memory cues) and disorganized (e.g. lacking efficient prioritisation of goal-relevant information). This is highly prevalent in neurological patients (e.g. following stroke or in early dementias) and also in neuropsychiatric disorders (e.g. attention biases by drug cues in addictions or attention biases by negative thoughts in depression). Our preliminary data has led us to hypothesize that ageing is associated with an impairment in how information in working memory is used to guide attention and optimise behavioural control. Our previous brain imaging work indicates that communication between subcortical areas located deep inside the brain (e.g. thalamus and hippocampus) and cortical areas (e.g. superior and prefrontal cortex) is critical for the inter-relation between memory and attention functions. But no prior work has systematically evaluated the impact of ageing on the above subcortico-cortical networks, as prior research on cognitive ageing predominantly focussed in studying the role of cortico-cortical (e.g. parietofrontal) networks. The present project has three strategic aims. The first aim is to understand how the brain implements our ability to control our working memory contents so that our behavioural goals are prioritised in an efficient manner. The second key aim is to characterise how these brain processes are affected by ageing.

PROJECTS BY
THE BASQUE GOVERNMENT

BCBL
ACTIVITY REPORT
2017/2020

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KK-201700103 NEUROMOD: THE CLOSED-LOOP NEUROMODULATION SYSTEM FOR SLEEP AND MEMORY ENHANCEMENT BASED ON NEURAL REGENERATION AND MANIPULATION

[Funding Agency
Basque Government

[Time Frame:
03/2017 - 12/2018

[Budget:
€56,469

[Coordinator:
Tecnalia

[Partners:
BCBL - PI Manuel Carreiras

The NEUROMOD system aims at becoming the "made in the Basque Country" brain regeneration and memory booster that works while you sleep. The system is based on the closed-loop neuromodulation technique and comprises an intelligent night cap that registers and stimulates the nervous system as well as an app including serious games focused on learning and memory enhancing, synchronized with the neurophysiological activity.

PI 2018-1-29 PRAD: PHONEMIC RECALIBRATION IN AVERAGE READER AND DYSLEXIC CHILDREN

[**Funding Agency**
Basque Government

[**Time Frame:**
09/2018 - 06/2021

[**Budget:**
€50,000

[**Coordinator:**
BCBL - PI Clara Martin

Reading acquisition (RA) changes brain functions and cognition profoundly. Despite ample research on RA, it has not been explored hitherto how RA recalibrates phonemic representations (PRs) and how such recalibration is impaired in dyslexia. The present project will shed light on this unexplored field of research by demonstrating how RA affects speech sound perception and production, which is highly relevant for a better modelling of speech perception and production and for improving teaching strategies and language disorder remediation. Learning to read changes the way one perceives spoken words and boosts phonemic awareness. In fact, after reading acquisition, spoken words with inconsistent phonemes (i.e., phonemes that have many spellings) are recognized slower and less accurately than those with consistent phonemes (i.e., that have only one possible spelling; 'orthographic consistency effect'). Plus, reading acquisition induces a boost in phonemic awareness (i.e., ability to distinguish and manipulate the minimal sounds of speech). Here, we make the claim that those consequences of RA can be explained by a unique and common phenomenon, which is the recalibration of PRs by literacy acquisition. More specifically, we argue that (1) PRs (in perception and production) become more stable (less dispersed) during the process of learning to read, accounting for the phonemic awareness boost during RA. We also claim that (2) this recalibration varies with the consistency of the reading system (i.e., (in)consistency of phoneme-to-grapheme conversion rules), which would in turn explain the 'orthographic consistency effect'. Thirdly, we argue that (3) phonemic recalibration is impaired in dyslexic patients.

We will explore phonemic recalibration and test our three main hypotheses by means of the first cross-linguistic and -sectional study examining the dispersion of PRs together with processing speed (both in perception and production of phonemes and words) in pre- and post-RA children, acquiring literacy in languages that differ in their conversion rules. We will demonstrate that Spanish-Basque bilinguals learning to read in Spanish or in Basque differ in their PRs when considering target phonemes that are shared by the two languages but that do not follow the same phoneme-to-grapheme conversion rules (e.g., the phoneme /b/, consistent in Basque –always spelled 'b'– and inconsistent in Spanish –spelled 'b' or 'v'–). Additionally, in order to explore the impairment of PR stabilization in dyslexia, we will compare children at risk of dyslexia (who later develop dyslexia) and dyslexic children with chronological age controls. We hypothesize that dyslexia is associated to an impairment in PR stabilization (i.e., all PRs remain highly dispersed after RA). Such a result would account for the (previously reported) lack of phonemic awareness boost and 'consistency effect' in this population.
This proposal provides the first systematic investigation of phonemic recalibration during reading acquisition, which is highly relevant for the fields of language development and impaired reading acquisition, enabling better detection of risks of dyslexia and the creation of remediation tools. Furthermore, findings from this project will make an essential contribution to pragmatic research and theoretical accounts of language perception and production, and will inform the adaptation of teaching strategies for reading acquisition in more than one language.

PROJECTS BY
THE BASQUE GOVERNMENT

BCBL
ACTIVITY REPORT
2017/2020

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PI 2019-54 LOOKING FOR WORDS: EARLY SPEECH SEGMENTATION ABILITIES AND THEIR RELATION TO VOCABULARY DEVELOPMENT IN BILINGUAL INFANTS

[Funding Agency
Basque Government

[Time Frame:
09/2019 - 09/2021

[Budget:
€43,395

[Coordinator:
BCBL - PI Marina Kalashnikova

Infants receive extensive exposure to speech in their environment from the moment they come to this world and even before then, and they face the challenging task of using this input to build their own native language skills. One of the most challenging tasks in language acquisition that infants encounter early on consists in segmenting the continuous speech that they hear around them. Speech segmentation plays an essential role in the process of vocabulary development as it allows infants to establish an initial store of word forms and later incorporate these word forms into their growing lexicon. This relation to later lexical development suggests that individual indices of speech segmentation abilities that can be assessed during the first year of life can be employed as reliable predictors of more sophisticated linguistic skills at the phonological, lexical, and grammatical levels developed much later in childhood. However, the exact mechanisms that underlie the emergence and consolidation of early speech segmentation abilities remain poorly understood. Furthermore, there is no evidence about the effects of bilingual language exposure on the development of this early linguistic ability despite the fact that the majority of infants around the world are bilingual and must learn to segment speech input in two languages simultaneously.
These two limitations are addressed in the present project that aims to systematically measure the emergence and consolidation of speech segmentation abilities in bilingual infants. This project adopts a multidisciplinary approach that combines the use of neurophysiological and behavioural infant measures and cross-sectional and longitudinal designs to chart the development of speech segmentation and lexical processing over infant's first year-and-a-half of life. This will be achieved via three experiments that will allow us to trace the developmental path from infants' early mechanisms of speech encoding to the emergence of productive vocabulary. Specifically, these experiments will focus on the emergence of three sets of skills that are essential for the processes of extracting words from continuous speech, speech comprehension, and vocabulary growth: speech segmentation, word recognition, and word learning. We expect to demonstrate that bilinguals will not exhibit an overall delay in speech segmentation and lexical development, but instead that the developmental trajectory of their language-specific encoding skills will develop based on their exposure and emerging competence in each of their languages. This project will allow us to determine the developmental timeline for the acquisition of early lexical skills specifically tailored to bilingual infants, which is essential for the design of age- and population-appropriate assessment tools for the early identification and detection of infants who are and are not at-risk for language delays.

PI 2019-104 QUANTIFYING THE DYNAMICS OF SPONTANEOUS BRAIN FLUCTUATIONS WITH CALIBRATED FUNCTIONAL MAGNETIC RESONANCE IMAGING TECHNIQUES

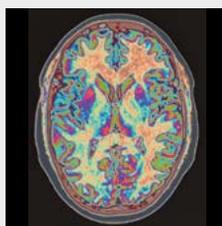**[Funding Agency**
Basque Government

[Time Frame:
09/2019 - 09/2021

[Budget:
€48,912

[Coordinator:
BCBL - PI César Caballero

Recent years have seen a rapidly growing interest in methods that enable time-varying functional connectivity (FC) analysis of brain activity using resting state functional magnetic resonance imaging (RS-fMRI) based on the blood oxygenated level dependent (BOLD) signal. Time-varying analyses have the potential to extract more information about brain function and reveal dynamic FC patterns that explain differences in behavioural performance within and across individuals, changes in cognitive state, arousal and vigilance, and distinguish between healthy controls and patients better than traditional functional connectivity approaches that consider a static measure of synchronization between brain regions. Notwithstanding their increasing popularity, there is still scarce availability of data, and thus information, about the neurophysiological mechanisms underlying time-varying fluctuations in spontaneous brain activity, particularly in the human brain, probably due to the lack of methods to approach this research question accurately. Since the BOLD signal is an indirect measure of neuronal activity, reflecting dynamic changes in cerebral blood flow, cerebral blood volume and oxygen metabolism, traditional fMRI BOLD experiments preclude any quantitative, calibrated interpretation of analyses and corresponding findings.

The goal of this project is to develop an integrated framework that jointly optimizes data acquisition protocols (MR pulse sequences and experimental procedures) and signal processing algorithms to enable an accurate and calibrated quantification of the dynamics of spontaneous brain activity and functional connectivity with concurrent ASL and multi-echo BOLD fMRI.

PROJECTS BY
THE BASQUE GOVERNMENT

PI 2020-1-0024 ACS.eus (APHASIA COGNITIVE SCREENING IN BASQUE): FILLING GAPS AND OVERCOMING BIAS IN CURRENT APHASIA ASSESSMENT

[Funding Agency
Basque Government

[Time Frame:
11/2020 - 11/2022

[Budget:
€48,340

[Coordinator:
BCBL - PI Simona Mancini
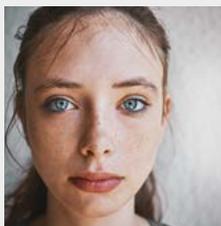
Aphasia is an acquired impairment characterized by partial or complete loss of any or all the modalities of linguistic communication: speaking, reading, listening and writing. Several normed tests are available for Germanic and Romance languages to assess the linguistic and cognitive profile of brain-damaged patients'. Yet, for languages like Basque, no standardized test is yet available, which limits the opportunity to conduct research on aphasia but, more importantly, undermines the reliability and validity of assessment conducted in clinical settings, as well as patients' access to adequate speech therapies.

The goal of the current project is to develop an aphasia assessment tool in Basque that condenses clinical and research domains, namely by focusing on the wide spectrum of linguistic abilities tested by comprehensive aphasia batteries, and, at the same time, testing language-specific properties with a research- and experimental-oriented approach (i.e. by relying on evidence and tools developed in neurolinguistic and cognitive neuroscience of language research) and by adopting a computerized approach. Concretely, an aphasia assessment tool is proposed, ACS.eus (Aphasia Cognitive Screening in Basque), that focuses on language comprehension and production using a variety of tasks implemented in an electronic tablet application. Such tasks have been extensively used in the psycholinguistic and cognitive neuroscience

of language literature and are therefore highly reliable to assess the integrity of expressive and receptive linguistic functions. Each task assesses a specific language function and mechanism, such as naming, repetition, lexical access, semantic knowledge morphology and morphosyntax production and comprehension, with visual as well as auditory input.

The realization of this project has important research, clinical and social implications. By testing an understudied language like Basque, this project will contribute to filling an important gap and to overcoming a bias in aphasia research and assessment towards Germanic and Romance languages, as revealed by recent analyses. From a research perspective, the assessment of several different linguistic functions in aphasic speakers will significantly enrich our knowledge on the mechanisms underlying language production and comprehension. From a clinical perspective, neuropsychologists and speech therapists will be able to rely on a valid, reliable and fine-grained tool to evaluate linguistic impairment in a language in which, so far, no reliable tool has been developed. But more importantly, the Basque society at large will benefit from this project. The possibility to receive more careful screening can lead to a more personalized and specific assessment, which, in turn, will lead to a more focused and effective intervention, significantly improving patients' quality of life.

4.B RESEARCH PROJECTS

**(EXP.2020/01203) (A720200352)
DIRECT GRANT TO DEVELOP THE
TRANSFER PROJECT: AWAKE PATIENT,
SURGERY ON ELOQUENT AREAS**

[Funding Agency
Basque Government

[Time Frame:
01/2020-12/2020

[Budget:
€200,000

[Coordinator:
BCBL - Miguel Arocena

The aim of this grant is to provide researchers and professionals working in the areas related to these research lines with a platform to develop cutting-edge research at the international level. The main objective of this grant is to develop a collaborative research project in the scope of Biosciences and Health, in order to assess the clinical safety in terms of surgery of eloquent areas with awake patient in the Hospital Universitario Cruces hospital, in collaboration with the BCBL and Biocruces.

Within the "Neurodegeneration, brain damage and rehabilitation" research line, a unique and cutting-edge project is being developed for transfer society. The survival of a patient with a brain tumor depends on the degree of malignancy and the surgical resection performed. That is why surgery on awake patients is an efficient technique in patients with brain tumors, since it prolongs the patient's survival, as well as the disease-free period, maintaining their quality of life.

Basque Foundation for Science

SUPPORT FOR TECH-TRANSFER ACTIVITIES: AGREEMENT TO LAUNCH THE NEURESOFT DIAGNOSIS PACKAGE

[Funding Agency
Ikerbasque

[Time Frame:
10/2009 - 10/2013

[Budget:
€200,000

[Coordinator:
BCBL - Miguel Arocena

Thanks to the transfer agreement signed with Ikerbasque, there has been significant progess in the development of the batteries and the platform encompassing them, so that professionals can access clinical histories, user profiles, normative data, evaluation reports, payment gatewey, etc. Even though the BCBL's main activity is research, linked to training, and the dissemination and diffusion of their research to both specialized public and society in general, it was clear from the beginning that this research would have specific aims through the transfer of knowledge and technology to the market.

That is why, in addition to carrying out basic research, the possibility of transferring the results of this investigation to society has always been considered. Precisely, based on this vocation, the BCBL created NEURE aiming at transferring part of the center's advances to society.

**2016-CIEN-000061-01 ARCHITECTURE
OF THE BILINGUAL BRAIN**

[Funding Agency
Gipuzkoa Government

[Time Frame:
10/2016 - 09/2017

[Budget:
€36,000

[Coordinator:
BCBL - PI Jon Andoni Duñabeitia

Recent evidence suggests that multilingualism contributes to brain and cognitive reserve in the elderly, since it improves specific cognitive abilities and facilitates restructuration of the brain neuroarchitecture and temporarily palliates the effects of cognitive declivity associated with both normal and/or pathological aging. Nevertheless, the results obtained so far are not conclusive and there are still many doubts with respect to the neuroachitectonic changes produced by the continued use of more than one language from childhood through to senescence. To better understand brain substrates of bilingualism across lifespan, we will investigate which cognitive processes and neural substrates or mechanisms of these processes differ or are common among monolingual children, young adults and elderly (who speak and know only one language) and native multilinguals (who know and speak more than one language from birth). The project will have a transversal investigation approach to offer critical evidence at basic and applied scientific levels about the impact of multilingualism (both at brain and cognitive levels) on childhood, young adulthood and critically on the elderly, thus exploring the relationship among multilingualism, neuroplasticity and neuroprotection.

99/17 NEUROBIOLOGICAL MARKERS FOR DIAGNOSING SPECIFIC LANGUAGE IMPAIRMENT (SLI) IN BILINGUAL CHILDREN

[Funding Agency
Gipuzkoa Government

[Time Frame:
09/2017 - 09/2018

[Budget:
€25,620

[Coordinator:
BCBL - PI Marie Lallier

The present project focuses on studying the physiological neurobiological indices of the brain that allow us to diagnose specific difficulties in the production and comprehension of oral language (Specific Language Impairment, LSI). To this end, we studied the typology of the phonological impairment that characterizes SLI at the behavioral level and analyzed the underlying bases at the functional level of the brain. The studies carried out with the electroencephalography technique (EEG) analyze the automatic response to process different phonological aspects and do not require any linguistic task. Therefore, these neurophysiological parameters can be acquired even in children at a very young age. Creating a direct connection between a behavioral language impairment and a brain impairment will allow us to detect SLI at an early developmental stage, when the behavior cannot YET be easily assessed, since the development is not as evident.

4.B RESEARCH PROJECTS

218/18 ACS.esp APHASIA: COGNITIVE SCREENING FOR SPANISH LANGUAGE UNIFYING CLINICAL AND NEUROSCIENTIFIC PERSPECTIVES

[Funding Agency
Gipuzkoa Government

[Time Frame:
10/2018 - 09/2019

[Budget:
€33,780

[Coordinator:
BCBL - PI Simona Mancini

Aphasia is an acquired impairment characterized by partial or complete loss of any or all the modalities of linguistic communication: speaking, reading, listening and writing. Several tools are available that are used by neuropsychologists and speech therapists to assess brain-damaged patients' linguistic profile. Existing screening and aphasia assessment batteries are primarily conceived for clinical purposes. They provide a general assessment of linguistic functions in brain-damaged patients that enables clinicians to determine the type of aphasic syndrome a patient is suffering from (e.g. whether Broca's or Wernicke's aphasia). Yet, they do not take into account consolidated findings from neurolinguistics and cognitive neuroscience research, and are often not designed to assess specific properties of a language. In light of this, the goal of the current project is to develop an aphasia assessment tool that condenses clinical and research domains, namely by focusing on the wide spectrum of linguistic abilities tested by comprehensive aphasia batteries, and, at the same time, testing language-specific properties with a research- and experimental-oriented approach (i.e. by relying on evidence and tools developed in neurolinguistic and cognitive neuroscience of language research). Concretely, an aphasia assessment tool is proposed, the ACS.esp (Aphasia Cognitive Screening in Spanish), that focuses on language

comprehension and production using a variety of tasks that have been extensively used in the psycholinguistic and cognitive neuroscience of language literature, and that are therefore highly reliable to assess the integrity of expressive and receptive linguistic functions. Each task assesses a specific language function and mechanism, such as naming, repetition, lexical access, semantic knowledge morphology and morphosyntax.

The realization of this project has important research, clinical and social implications. From a research perspective, the assessment of several different linguistic functions in aphasic speakers will significantly enrich our knowledge on the mechanisms underlying language production and comprehension. From a clinical perspective, neuropsychologists and speech therapists will be able to rely on a valid, reliable and fine-grained tool to evaluate linguistic impairment. But more importantly, the society at large will benefit from this project. Indeed, the possibility to receive more careful screening can lead to a more personalized and specific assessment, which, in turn, will lead to a more focused and effective intervention, significantly improving patients' quality of life.

PROJECTS FUNDED BY THE PROVINTIAL GOVERNMENT OF GIPUZKOA

ADINBERRI: TRAINING OF SUPERIOR COGNITIVE CAPACITIES IN THE ELDERLY

[Funding Agency
Gipuzkoa Government

[Time Frame:
10/2018 - 09/2019

[Budget:
€83,434

[Coordinator:
BCBL - PI Kepa Paz-Alonso

Older adults are fastest growing population in Europe. As people age, there is an increased risk of cognitive and functional declines. Therefore, researchers have explored various interventions to improve cognition and delay the onset of functional decline, including computerized cognitive training (CCT). This area of research has shown beneficial effects of CTT on various higher cognitive capacities in older adults. However, the extent to which these changes are associated with brain changes in regions linked to cognitive decline in the elderly is still unknown.

The main objective of the present project in healthy aging is to study the potential benefits of a training program specifically designed to train language, memory and executive functions (EF) in older adults (55-75 years old) and to investigate whether these benefits are associated with the brain changes in the lateral temporal lobe, the hippocampus, or the parietal and frontal cortex. The results of the present project may have a high scientific and applied impact; and although it is basic research, its results may have a direct translation to CCT programs that could be used in the elderly as a non-pharmacological intervention that contributes to their quality of life and well-being.

302/2018A GARAPEN: DEVELOPING METHODOLOGY FOR ASSESSMENT, MONITORING, COACHING, TRAINING AND MENTORING FOR BCBL PROFESSIONALS

[Funding Agency
Gipuzkoa Government

[Time Frame:
10/2018 - 09/2019

[Budget:
€16,000

[Coordinator:
BCBL - PI Miguel Arocena

This project aims to advance in the processes of assessment and development of BCBL workers, creating favorable contexts through learning and enabling generating a differential value, developing learning dynamics in scientific-technical skills at the BCBL that respond to new challenges and future expectations.

PROJECTS FUNDED BY THE
PROVINTIAL GOVERNMENT OF GIPUZKOA

302/2018B EMPLOYER BRANDING: TRAINING OF SUPERIOR COGNITIVE CAPACITIES IN THE ELDERLY

[Funding Agency
Gipuzkoa Government

[Time Frame:
10/2018 - 09/2019

[Budget:
€7,300

[Coordinator:
Parque Tecnológico de San Sebastián

The aim of this project is to strengthen the positioning of the BCBL in the international talent market through the development and implementation of strategies and action plans for Talent Attraction and Retention and the improvement of its employer brand.

4.B RESEARCH PROJECTS

23/2019 BUILDING BRIDGES BETWEEN NEUROSCIENCES AND NEUROSURGERY: MAPPING THE ELOQUENT AREAS IN PATIENTS WITH BRAIN TUMORS

[**Funding Agency**
Gipuzkoa Government

[**Time Frame:**
10/2019 - 11/2020

[**Budget:**
€29,240

[**Coordinator:**
BCBL - PI César Caballero and Ileana Quiñomes

The aims of the present research proposal are (i) to structurally and functionally characterize the language network using a novel approach from a theoretical and methodological point of view, (ii) to characterize the plasticity mechanisms that are triggered due to a brain injury, (iii) to create a connectionist model of the language network that takes into account the specific characteristics that affect each individual in a unique way, and (iv) to evaluate the ability of this model to predict how the recovery of post-surgical patients with brain injuries affecting eloquent areas will be. Each of these objectives implies very specific methodological challenges including (i) optimizing protocols for registering and analyzing brain activity, (ii) creating specific tools that allow the combination of different types of information, (iii) implementing tools that allow for the combination of different types of information, (iii) implementing tools that allow the extrapolation of information from patients into generalizable information at the population level.

PROJECTS FUNDED BY
OTHER INSTITUTIONS

BCBL
ACTIVITY REPORT
2017/2020

153

NPRP 6-378-5-035 LEARNING TO READ IN TWO ALPHABETS: TYPICAL DEVELOPMENT AND READING DISORDERS

[Funding Agency
Qatar Foundation

[Time Frame:
04/2014 - 03/2017

[Budget:
€339,804

[Coordinator:
BCBL - PI Manuel Carreiras
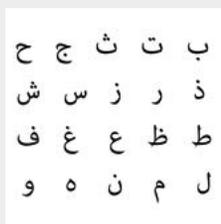
This project addresses challenges related to the development of reading skills. One general objective is to understand school failure when children have to face learning in two alphabets, and how this phenomenon could be linked to reading deficits. Equally importantly, we also aim to develop a perspective about the factors helping the children succeed. The main objective of the project is to study the mechanisms of literacy acquisition in two alphabets (Arabic and Roman), as well as to investigate the relations between reading difficulties (dyslexia) in two very different languages (in Arabic and in English) that use different alphabets (Arabic, Roman).

BRAIN CHANGES ASSOCIATED WITH ADULT LITERACY

Fundación **BBVA**

[Funding Agency
Fundación BBVA

[Time Frame:
10/2016 - 03/2018

[Budget:
€34,000

[Coordinator:
BCBL - PI Jon Andoni Duñabeitia

This project approaches a major issue, not only for its scientific interest, but also for the socioeducational impact of the possible findings: the existing differences between the brain and the cognitive processes of literate and illiterate people. What are the differences between the illiterate brain and the literate brain? What are the neural and cognitive deficits associated with illiteracy? What changes occur in the brain and cognition when acquiring reading and writing? The answers to these questions are of special interest not only for the neuroscientific community, but also for the numerous developing countries where illiteracy is a reality. The present project aims at discovering the neurocognitive markers that characterize literate individuals, differentiating them from illiterate individuals, and to which extent this neural and cognitive breach between both groups could be bridged through educational processes, to ensure that illiterate adults can acquire reading and writing. Behavioral, electrophysiological and neuroanatomic indicators that present a differential characteristic between groups of literate and illiterate adult individuals will be explored, and also how the brain and cognition change in adult individuals when facing the learning process of reading will be studied in a longitudinal way. Thus, this project aims to delve into this differential indicators of illiteracy through electrophysiological and neuroimaging techniques in illiterate and literate populations, thanks to the close international collaboration between centers, in order to characterize in a descriptive manner the existing differences between individuals who know how to read and write and those who do not, and how certain cortical structures and cognitive abilities improve when learning how to read in adulthood.

PROJECTS FUNDED BY OTHER INSTITUTIONS

Fundación **BBVA**

ACS.ESP: APHASIA COGNITIVE SCREENING IN BASQUE

[**Funding Agency**
Fundación BBVA

[**Time Frame:**
10/2018 - 04/2020

[**Budget:**
€35,000

[**Coordinator:**
BCBL - PI Simona Mancini

Aphasia is an acquired impairment characterized by partial or complete loss of some or all the modalities of linguistic communication. Several batteries and screening tests are available to neuropsychologists and speech therapists to assess the linguistic profile of brain-damaged patients. These tools are primarily conceived for clinical purposes and so they provide a general assessment of linguistic functions. Yet, they are seldom complemented with neuroimaging techniques and do not take into account consolidated findings from the cognitive neuroscience of language research. The goal of the current project is to introduce a neuroscientific approach in the domain of language impairment assessment. Concretely, an aphasia assessment tool is proposed, the ACS.esp (Aphasia Cognitive Screening in Spanish), that centers on a variety of tasks and techniques that have been extensively used in cognitive neuroscience of language, and that are therefore highly reliable to assess the integrity of expressive and receptive linguistic functions. Unlike existing tools, ACS.esp involves the validation of linguistic performance measures with neuroimaging techniques that allow correlating the site and extent of a lesion, the integrity white matter tracts, and spontaneous fluctuations in the BOLD signal of patients with the type and severity of the linguistic deficit. The realization of this project has important research, clinical and social implications. From a research perspective, it will enrich our knowledge on the neurobiology of language functions. From a clinical perspective, neuropsychologists and speech pathologists will be able to rely on a valid, reliable and fine-grained tool to evaluate linguistic impairment. But more importantly, the possibility to receive a more careful screening will lead to more careful planning of intervention and treatment of linguistic deficits, thus significantly improving patients' quality of life.

4.B RESEARCH PROJECTS

HR18-00178 DYSTHAL:
DYSLEXIA AND THE THALAMUS:
INTEGRATING ANATOMY AND
FUNCTION A MECHANISTIC ACCOUNT
OF THE READING BRAIN

[**Funding Agency**
Fundación LA CAIXA

[**Time Frame:**
12/2019 - 11/2022

[**Budget:**
€500,000

[**Coordinator:**
BCBL - PI Manuel Carreiras

Reading is one of the most exciting discoveries in our lives. It has been the most relevant information transmission vehicle for knowledge dissemination and for humanity progress. Instrumental in learning other cognitive abilities, nowadays it is an essential skill in modern societies for social, cultural, and economic exchanges. However, one out of ten people suffer from dyslexia, a developmental disorder characterized by difficulties to master the elements of literacy successfully. Curiously, despite impressive scientific advances in the study of reading, we still do not know why some children learn to read without difficulty whereas others fail. This project will break new ground by developing a comprehensive novel, multidisciplinary investigation of the psycholinguistic, neurocognitive, and neuroanatomical bases of reading and dyslexia. It will also radically change the current research focus on the cortex. Instead, our proposal aims to provide new light into how thalamocortical circuits support reading, and how reading disabilities occur as a consequence of breakdowns in these circuits. The ultimate goal is to generate a novel mechanistic account of reading and dyslexia by using a pioneering multimodal neuroimaging approach to investigate (1) how dynamically coordinated thalamocortical and corticocortical networks orchestrate reading; and (2) how dyslexia is characterized by atypical functional connectivity and abnormal structural connections in different brain circuits. Furthermore, we will generate a predictive model of neurobiology of dyslexia with machine learning techniques. Deficient tuning of specific thalamic nuclei with cortical areas could underlie different subtypes of dyslexia. This highly integrated investigation will lead to a new conceptualization of reading that is paramount to understand and diagnose reading disabilities, to develop effective therapies to treat them, and to inform optimal educational approaches for learning to read

PROJECTS FUNDED BY OTHER INSTITUTIONS

TYPICAL AND ATYPICAL READING AND THALAMOCORTICAL INTERACTIONS: A MECHANISTIC ACCOUNT OF READING BASED ON FUNCTIONAL AND STRUCTURAL NETWORKS

[Funding Agency
Fundación TATIANA PEREZ DE GUZMAN EL BUENO

[Time Frame:
01/2019 - 12/2021

[Budget:
€47,850

[Coordinator:
BCBL - PI Kepa Paz-Alonso and Manuel Carreiras

Reading is one of the most exciting discoveries in our lives. It has been the most relevant information transmission vehicle for knowledge dissemination and for humanity progress in the last 4,000-5,000 years. Instrumental for learning other cognitive abilities, nowadays it is an essential skill in modern societies for social, cultural, and economic exchanges. However, about 5-10% of the population suffer dyslexia, a developmental disorder characterized by difficulties to successfully master the elements of literacy. Despite impressive scientific advances in the study of the neurobiology of reading, we still do not know why some children learn to read without difficulty whereas others fail. This research project is aimed at developing a comprehensive multidisciplinary investigation of the psycholinguistic, neurocognitive, and neuroanatomical bases of typical reading and dyslexia and at providing new light into how thalamocortical interactions support typical reading, and how reading disabilities occur as a consequence of breakdowns in these circuits. The ultimate goal is to generate a novel mechanistic account of reading and dyslexia by using a pioneering multimodal neuroimaging approach to investigate (1) how dynamically coordinated thalamocortical and cortico-cortical networks orchestrate reading; and (2) how dyslexia is characterized by atypical functional connectivity and abnormal structural connections in these brain circuits. This highly integrated investigation will lead to a new conceptualization of reading that is paramount to understand and diagnose reading disabilities, to develop novel diagnostic strategies for early detection of reading deficits, and to inform educational approaches for learning to read.

4.B RESEARCH PROJECTS

1749143- EXAMINING VARIABILITY IN THE NATIVE LANGUAGE AND ITS INFLUENCE ON SECOND LANGUAGE LEARNING

[Funding Agency
1. NSF-National Science Foundation

[Time Frame:
06/2018 - 11/2021

[Budget:
€72,055

[Coordinator:
BCBL - PI Manuel Carreiras

The current study uses event-related potentials (ERPs) to examine the hypothesis that there is a link between success in the processing of referential dependencies in a second language (L2) and the ability to track linguistic and discourse-relevant information in the native language (L1). The establishment of referential dependencies, which occur when two linguistic expressions are interpreted as referring to the same individual, is an area that has long been recognized as challenging for both native speakers and L2 learners, but the two bodies of research have proceeded independently. The current study unites these bodies of research, examining the processing of overt pronouns in discourse in two groups of L2 learners, English-speaking learners of Spanish and Spanish-speaking learners of English, testing all participants in both their L1 and L2. All participants will take an extensive battery of individual difference measures which assess both linguistic and cognitive skills. Participants will be assigned to one of two studies, which differ with respect to whether or not the behavioral task associated with the ERP experiment asks participants to explicitly focus on pronominal reference. The goal is to develop a predictive model of the contexts and conditions under which native speakers and L2 learners are successful in discourse comprehension. In utilizing ERP, a more fine-grained characterization of the processes underlying comprehension in the L1 and L2 becomes possible, allowing us to examine whether L1 and L2 processing are qualitatively different.

PROJECTS FUNDED BY OTHER INSTITUTIONS

PROYE20005CARR - BIOMARKERS OF COGNITIVE RECOVERY AFTER BRAIN TUMOR RESECTION

[Funding Agency
Fundación Científica AECC

[Time Frame:
12/2020 - 11/2023

[Budget:
€300,000

[Coordinator:
BCBL - PI Manuel Carreiras

Diffuse low-grade glioma (DLGG) is a primary brain tumor that affects an individual's cognitive faculties. The slow growth of this type of lesion allows the brain to reorganize its structure and functions, delaying the onset of the cognitive symptoms. However, DLGG unavoidably evolves to become a more invasive type of tumor, at the expense of both survival and the prognosis for healthy cognitive function. Malignant transformation of DLGG is directly related to tumor volume and to growth velocity. Surgical resection, which works by drastically decreasing tumor volume, has proven to be the most effective intervention for delaying anaplastic transformation. In the last decade, it has radically changed the life expectancy of these patients from 5 to 15 years, as stated in the most recent publications. Nonetheless, surgical resection of these tumors can unintentionally damage the neural substrates of critical cognitive functions, since DLGG frequently involves areas deemed to be language, motor, visuospatial, or memory hubs. In this ambitious translational project, which lies at the nexus of neurosurgery, neuroscience, biomedical imaging, computer science and statistics, we propose to build an accurate and reliable model that can predict an individual patient's postsurgical cognitive recovery using presurgical neuro-anatomical and neuro-functional information. This is a primary need, for both clinicians and patients, promoting better outcomes for surgeries, longer life expectancy and better quality of life for patients. By applying machine learning algorithms to a compendium of clinical, behavioral, neuro-anatomical, and connectomic features from a sample of individuals with DLGG and healthy controls, we will be able to identify biomarkers of postsurgical cognitive outcomes (language, memory, executive functions, attention, and control). The tools we are planning to develop will allow surgical teams to tailor interventions on a patient-by-patient basis, both before and after surgery. By analyzing presurgical and postsurgical data combining longitudinal and transversal approaches, we will also be able to investigate how the appearance of a brain lesion impacts brain network dynamics, and whether this network malleability represents an adaptive advantage for post-surgery brain recovery processes. In sum, we will identify biomarkers of postsurgical cognitive recovery using presurgical neuro-anatomical and functional information.

DIAGNOSIS TOOLS
FOR DYSLEXIA IN BASQUE

[Funding Agency
Fundación KUTXABANK

[Time Frame:
12/2019 - 03/2021

[Budget:
€19,972

[Coordinator:
BCBL - PI Miguel Arocena

The aim of this project is to provide comprehensive neuropsychological assessments in the field of learning disorders, including the latest advances achieved by the BCBL research team, in addition to the use of neuroimaging techniques. The goal is to develop and commercialize an IT tool on a web platform, oriented towards the diagnosis of dyslexia in Basque. In fact, the lack of diagnostic batteries in Basque offers an opportunity for immediate entry into the Guipuzcoan market and, by extension, into the Basque market.

COMISIÓN EUROPEA-EUROPEAN EXECUTIVE AGENCY (REA)

01. H2020-PEOPLE-2014-EF-658926-BILMEMBRAIN- PI Eugenia Marín,
Budget: 158.121€, 2016-2017

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02. H2020-PEOPLE-2014-EF-654917-BIBICROSSLANG- PI Marcel Giezen,
Budget: 170,121€, 2016-2017

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03. H2020-PEOPLE-2014-EF-657474-BIOMARK- PI Lisa Wilson,
Budget: 170,121€, 2016-2018

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04. H2020-PEOPLE-2015-EF-657474-VIAWORD- PI Rocío López Zunini,
Budget: 170,121€, 2016-2018

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05. H2020-MSCA-IF-2016-GA-743691-CAB- PI Angela De Bruin,
Budget: 158,121€, 2017-2019

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06. FP7-SSH-2013-1-GA613465 ATHEME- Advancing the European Multilingual
Experience, 2014-2019

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07. H2020-MSCA-IF-2017-GA-799554-E-CLIPS- PI Sara Guediche,
Budget: 158,121€, 2018-2021

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08. H2020-MSCA-IF-2017-GA- 793919- OptiSeLL- PI Effie,
Budget: 170,121€, 2018-2021

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09. H2020-MSCA-IF-2017-GA-798971-PreSpeech- PI Anastasia Klimovich,
Budget: 170,121€, 2018-2020

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10. H2020-MSCA-IF-2017-GA-798908-OptimisingIDS- PI Marina Kalashnikova,
Budget: 158,121€, 2018-2020

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11. H2020-MSCA-GF-2017-GA-795807-ReCiModel- PI Garikoitz Lerma,
Budget: 257,191€, 2018-2021

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12. H2020-MSCA-GF-2017-GA-792331-MetaBil-PI Leona Polyanskaya,
Budget: 170,121€, 2018-2021

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13. H2020-MSCA-GF-2018-GA- 837228-ENGRAVING- PI S. Caffarra, 245.732€,
2019-2022

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14. H2020-MSCA-IF-2018-GA- 838536-BILINGUALPLAS- PI J. Cespón,
Budget: 185.721€, 2020-2022

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15. H2020-MSCA-IF-2018-GA- 843533-LIPPS- PI A. Stoehr,
Budget: 173.721€, 2020-2022

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16. H2020-MSCA-IF-2017-GA-793919-OptiSeLL- PI Efthymia Kapnoula,
Budget: 170.121€, 2019-2021

05

SCIENTIFIC PERFORMANCE

SCIENTIFIC OUTPUT

BCBL has published 326 papers
of different types in the period
2017-2020.

INDEXED PUBLICATIONS BY TYPE

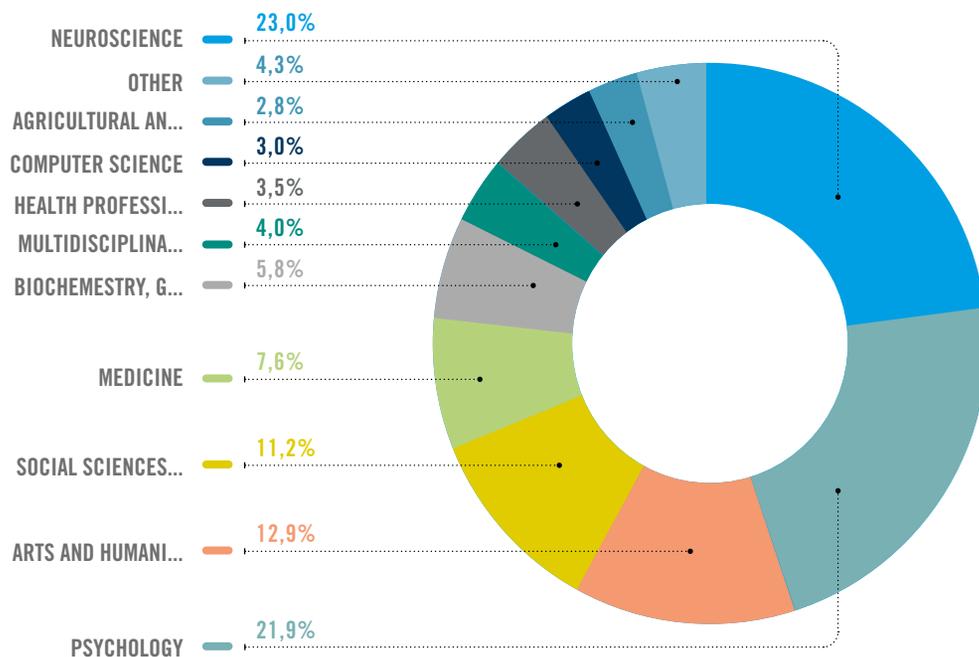|			
SCHOLARLY OUTPUT			
ARTICLE			
REVIEW			
NOTE			
SHORT SURVEY			
EDITORIAL			
CONFERENCE PAPER			
BOOK CHAPTER			
DATA PAPER			
ERRATUM			

DATA PAPER — 0,3%
SHORT SURVEY — 0,9%
NOTE — 1,2%
ERRATUM — 1,5%
CONFERENCE PAPER — 2,5%
REVIEW — 5,2%
ARTICLE — 88,3%
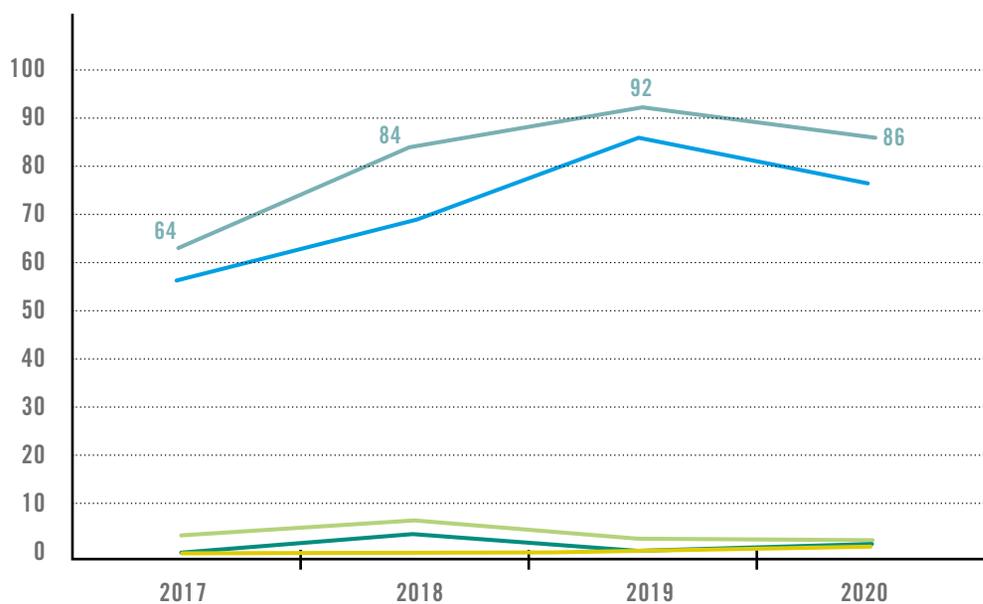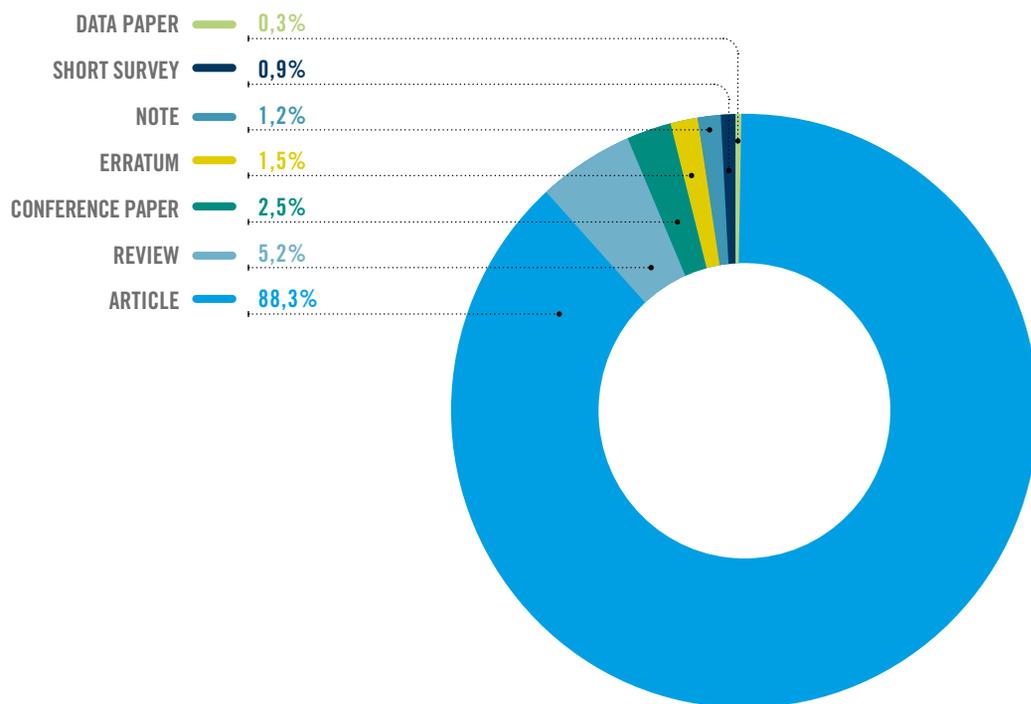
Mostly all of BCBL papers are published in high-impact journals or prestigious conferences.

**BCBL PRODUCTION
VS. SCOPUS PRODUCTION**

Year	BCBL Output	Scholarly Output
2017	68	64
2018	86	84
2019	94	92
2020	88	86

BCBL OUTPUT ●
SCHOLARLY OUTPUT ●
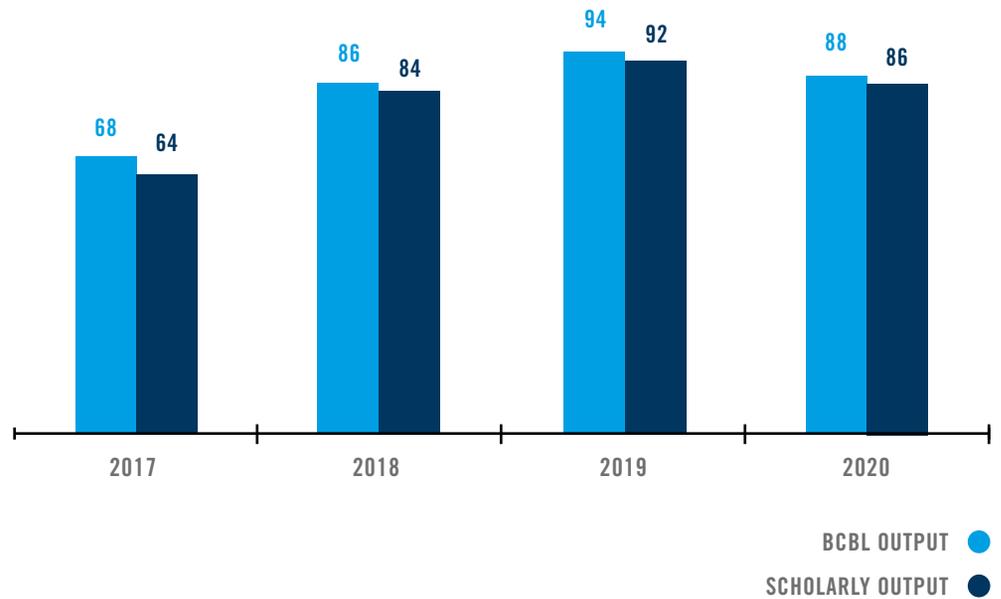
Documents by subject area in Scopus
in the period 2017-2020 show that
BCBL has a multidisciplinary profile,
where its four major working areas are
Neuroscience, Psychology, Arts and
Humanities, and Social Sciences.

NEUROSCIENCE **23,0%**
OTHER **4,3%**
AGRICULTURAL AN... **2,8%**
COMPUTER SCIENCE **3,0%**
HEALTH PROFESSI... **3,5%**
MULTIDISCIPLINA... **4,0%**
BIOCHEMESTRY, G... **5,8%**
MEDICINE **7,6%**
SOCIAL SCIENCES... **11,2%**
ARTS AND HUMANI... **12,9%**
PSYCHOLOGY **21,9%**

5.A PUBLICATIONS

VISIBILITY AND IMPACT OF THE SCIENTIFIC OUTPUT

Publications in Top Journal Percentiles in Scival, the tool used for the bibliometric analysis, indicate the extent to which an entity's publications are present in the most-cited journals in the data universe: how many publications are in the top 10% (Decile 1, D1) or 25% (Quartile 1, Q1) of the most-cited journals indexed by Scopus, being Scopus the database that covers more accurately the papers in Social Sciences and Humanities compared to the Web of Science, which is better at indexing papers in pure Science and Technology.

The average number of papers published in Q1* journals during the period 2017-2020 is of 66, and of 51 in D1.

PUBLICATIONS IN ALL JOURNAL QUARTILES & DECILES BY CITESCORE 2017-2020

D1 ●
Q1 ●
Q2 ●
Q3 ●
Q4 ●
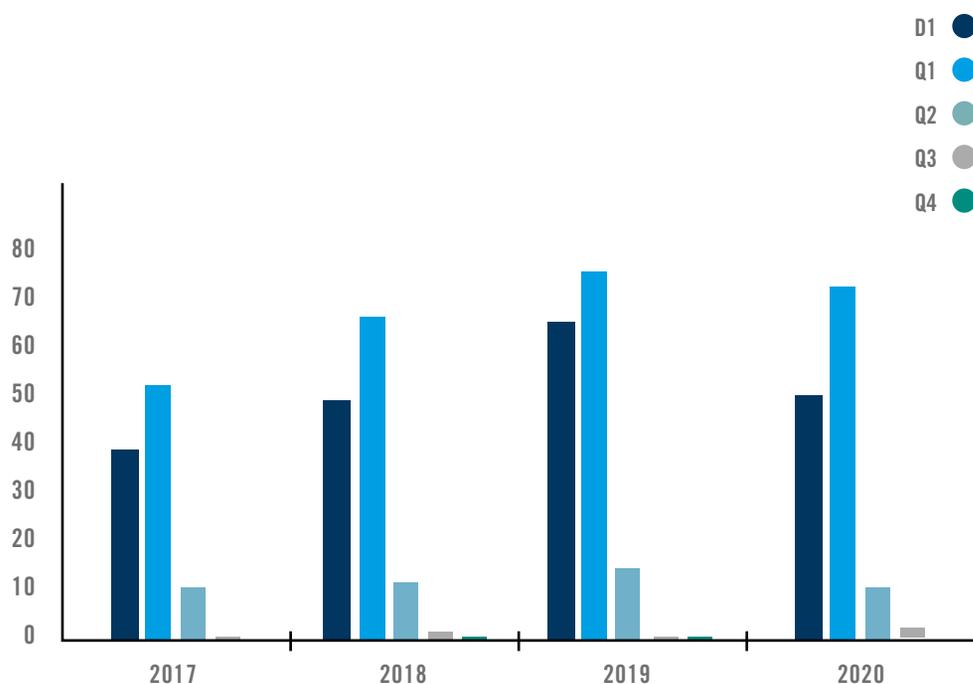
*The database used is Citescore from Scopus

The average of Q1 publications in this period comes to an 81%, and a 62% for the papers in D1 publications, which shows that BCBL research has consistently gained and maintained positions in the field.

% OF ARTICLES IN Q1 & D1

Q1 ●
D1 ●

	2017	2018	2019	2020
Q1	81%	79%	82%	84%
D1	61%	58%	71%	58%
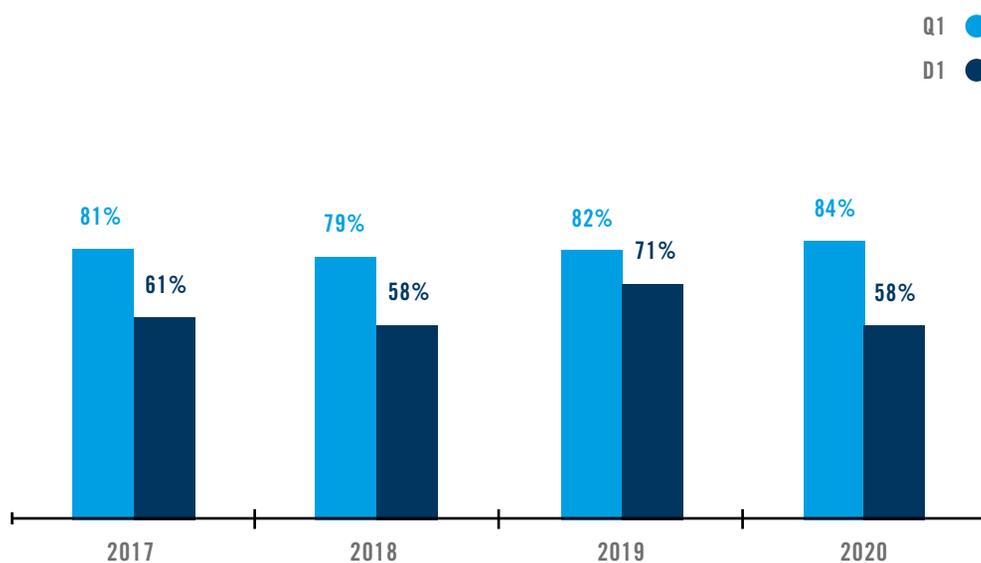
5.A PUBLICATIONS

Top 20 D1 most-cited Journals ranked by number of publications

See below a list of selected D1 journals in which BCBL researchers published during the 2017-2020 period:

Scopus Source title	No of articles in the journal	CiteScore*
NeuroImage	23	10.2
Scientific Reports	17	7.2
Cortex	12	6.7
Language, Cognition and Neuroscience	11	4.1
Cognition	9	6
PLoS ONE	8	5.2
Brain and Language	8	4.8
Journal of Experimental Psychology: Learning Memory and Cognition	7	5.1
Behavior Research Methods	6	7.5
Developmental Science	6	6.9
Journal of Memory and Language	6	6.8
Bilingualism	5	5
Movement Disorders	4	12.7
Annals of the New York Academy of Sciences	4	8.2
Human Brain Mapping	4	7.9
Clinical Neurophysiology	4	7
Proceedings of the National Academy of Sciences of the United States of America	3	15.7
European Journal of Nuclear Medicine and Molecular Imaging	3	11.5
Cerebral Cortex	3	10.4
PLoS Computational Biology	3	7.3

Note: Journal metrics for 2019 taken from latest Scopus Citescore.

*Citescore of an academic journal is a measure reflecting the yearly average number of citations to recent articles published in that journal. This journal evaluation metric was launched in December 2016 by Elsevier as an alternative to the generally used JCR impact factors (calculated by Clarivate). CiteScore is based on the citations recorded in the Scopus database rather than in JCR, and those citations are collected for articles published in the preceding four years instead of two or five.

Top 20 most cited Journals

See listed below the top 20 cited journals in which BCBL researchers published during the 2017-2020 period:

Scopus Source title	Citescore	Citations*
NeuroImage	10.2	414
Psychological Bulletin	29.4	167
Scientific Reports	7.2	122
The Lancet Neurology	44.6	114
Philosophical Transactions of the Royal Society B: Biological Sciences	11.4	90
Behavior Research Methods	7.5	85
Cognition	6	81
Frontiers in Psychology	3.2	71
Molecular Psychiatry	22.7	64
Quarterly Journal of Experimental Psychology	4.1	61
Movement Disorders	12.7	59
Proceedings of the National Academy of Sciences of the United States of America	15.7	56
European Journal of Neuroscience	5.1	39
Brain Connectivity	6.3	35
Journal of Memory and Language	6.8	32
Ageing Research Reviews	18.9	31
PLoS Computational Biology	7.3	30
Cognitive Science	4.4	26
Behavioral Sciences	2.5	25
World Neurosurgery	2.4	22

Note: Journal metrics for 2019 taken from latest Scopus Citescore.

5.A PUBLICATIONS

NORMALIZED IMPACT ON SCIENTIFIC OUTPUT

The normalized impact is an indicator of the quality of the scientific production. Field-Weighted Citation Impact in SciVal indicates how the number of citations received by an entity's publications compares with the average number of citations received by all other similar publications in the data universe.

A Field-Weighted Citation Impact of 1.00 indicates that the entity's publications have been cited exactly as would be expected based on the global average for similar publications; the Field-Weighted Citation Impact of "World", or the entire Scopus database, is 1.00. A Field-Weighted Citation Impact of more than 1.00 indicates that the entity's publications have been cited more than would be expected based on the global average for similar publications, whereas a Normalized Impact of less than 1.00 indicates that the entity's publications have been cited less than would be expected, less than the world average.

This value will allow us to analyze and compare the impact of BCBL's scientific output compared to other strategic centers.

Although there have been some fluctuations over time descending to 1.20 in 2019, the following year the received citations had a significant increase to the point of being 50% over the world average in 2020. In any case, the average for this period is 45% of citations received over the global average for similar publications, which indicates a healthy evolution of BCBL's impact in its scientific domains.

SciVal   Benchmarking   Reporting   My SciVal   Scopus ↗

2017 to 2020 ⌄   All subject areas   ⌄   ASJC   ⚪ 🔍   Data s

⊞ Table   ∿ Chart   + Add to Reporting   Exp

Benchmark one metric by Publication Year | Benchmark multiple metrics ⌄

Metric: Field-Weighted Citation Impact ⌄

Entity ↑	2017	2018	2019	2020	Overall
⌂ BCBL – Basque Center on Cognition, Brain and Language	1.70	1.55	1.20	1.50	1.45
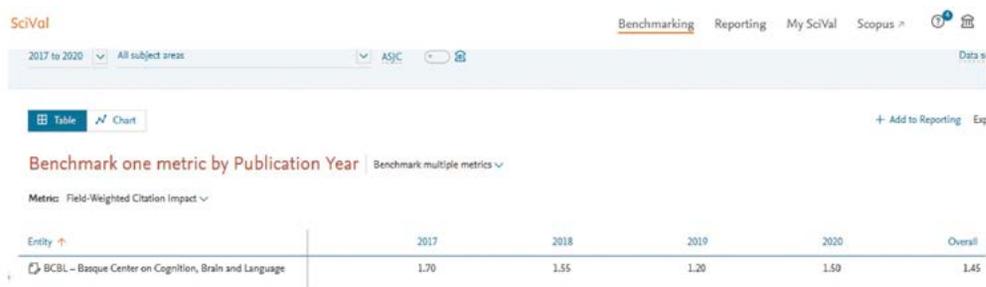
BENCHMARKING AGAINST INTERNATIONAL CENTERS LEADERS IN THE FIELD

Finally, in terms of visibility and impact, BCBL holds 4th position in Q1 journals compared to the rest of the centers, and 2nd position in D1 journals during the period from 2017 to 2020.

SciVal   Benchmarking   Reporting   My SciVal   Scopus ↗

2017 to 2020 | All subject areas

Benchmark one metric by Publication Year | Benchmark multiple metrics ∨

Metrics Publications in Top 25% Journal Percentiles by CiteScore Percentile (%) ∨

Entity	2017	2018	2019	2020	Overall
MRC Cognition and Brain Sciences Unit	85.1	87.6	84.0	100.0	86.3
Max Planck Institute for Psycholinguistics	82.5	76.7	89.0	88.8	84.3
UCL Institute of Cognitive Neuroscience	82.7	89.6	83.7	79.7	83.9
BCBL – Basque Center on Cognition, Brain and Language	81.3	81.5	81.5	83.7	82.0
Max Planck Institute for Human Cognitive and Brain Sciences	79.4	77.7	83.8	80.5	80.4
Institut des Sciences Cognitives - CNC	88.1	72.9	78.0	75.6	78.1
Donders Institute for Brain Cognition and Behaviour	79.4	78.9	69.2	77.8	75.8
Laboratoire de Psychologie Cognitive	76.2	61.3	78.8	76.6	71.9
Brams - Centre for Research on Brain, Language, and Music	80.6	65.4	66.7	60.0	69.4
Laboratoire de Neurosciences Cognitives -LNC	74.1	48.6	64.1	52.2	59.7

SciVal   Benchmarking   Reporting   My SciVal   Scopus ↗

▦ Table   ∿ Chart   + Add to Reporting   Exp

Benchmark one metric by Publication Year | Benchmark multiple metrics ∨

Metrics Publications in Top 10% Journal Percentiles by CiteScore Percentile (%) ∨

Entity	2017	2018	2019	2020	Overall
MRC Cognition and Brain Sciences Unit	62.4	62.8	62.4	73.7	63.0
BCBL – Basque Center on Cognition, Brain and Language	60.9	60.5	70.7	58.1	62.8
UCL Institute of Cognitive Neuroscience	63.5	69.8	62.5	35.4	62.8
Max Planck Institute for Human Cognitive and Brain Sciences	60.5	60.2	64.0	63.6	62.1
Max Planck Institute for Psycholinguistics	53.0	56.7	67.6	64.2	60.0
Institut des Sciences Cognitives - CNC	66.7	57.6	54.0	60.0	59.2
Donders Institute for Brain Cognition and Behaviour	58.8	63.2	42.3	59.3	55.1
Brams - Centre for Research on Brain, Language, and Music	51.6	57.7	47.6	50.0	52.0
Laboratoire de Psychologie Cognitive	46.0	45.2	50.0	49.0	47.5
Laboratoire de Neurosciences Cognitives -LNC	40.7	37.1	43.6	30.4	38.7

5.A PUBLICATIONS

2017

Journal Articles

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5.A PUBLICATIONS

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81. Vandermosten, M., Correia, J., Vanderauwera, J., Wouters, J., Ghesquière, P., & Bonte, M. (2020). Brain activity patterns of phonemic representations are atypical in beginning readers with family risk for dyslexia. *Developmental Science,* 23:e12857. Doi:10.1111/desc.12857

82. Zheng, Y., & Samuel, A.G. (2020). The Relationship Between Phonemic Category Boundary Changes and Perceptual Adjustments to Natural Accents. *Journal of Experimental Psychology: Learning, Memory, and Cognition,* 46(7):1270-1292. Doi:10.1037/xlm0000788

Conference Papers

1. Moia, S., Stickland, R. C., Ayyagari, A., Termenon, M., Caballero-Gaudes, C., & Bright, M. G. (2020). Voxelwise optimization of hemodynamic lags to improve regional CVR estimates in breath-hold fMRI. In 2020 42nd Annual International *Conference of the IEEE Engineering in Medicine & Biology Society* (EMBC), 1489-1492. Doi: 10.1109/EMBC44109.2020.9176225

2. Uruñuela, E.,Jones, S., Crawford, A., Shin, W.,Oh, S., Lowe, M., & Caballero-Gaudes. C. (2020). Stability-based Sparse Paradigm Free Mapping algorithm for deconvolution of functional MRI data. *In 2020 42nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (EMBC), 1092-1095. Doi: 10.1109/EMBC44109.2020.9176137

Book chapters/books

1. Caffarra, S., & Carreiras, M. (2020). Electrophysiological correlates of second language acquisition: from words to sentences. In Grimaldi, M., Y. Shtyrov, and E. Brattico, (Eds.): Language Electrified: Techniques, Methods, Applications, and Future Perspectives in the Neurophysiological Investigation of Language. Springer.

2. Caffarra, S., Dias, P., & Costello, B. (2020). The learnability of complex constructions from a cross-linguistic perspective. In Marcel Schlechtweg (Ed.): Trends in Linguistics. Studies and Monographs. De Gruyter Mouton. Doi: 10.1515/9783110695113-008

3. Finisguerra, A.*, Amoruso, L.*, & Urgesi, C. (2020). Beyond Automatic Motor Mapping: New Insights into Top-Down Modulations on Action Perception. In Noceti et al.(Eds.), Modelling human motion: From human perception to robot design. Springer Nature Switzerland AG. Doi: 10.1007/978-3-030-46732-6_3

4. Martorell, J., Morucci, P., Mancini, S., & Molinaro, N. (2020). Sentence processing: How words generate syntactic structures in the brain. In: Grimaldi, M., Y. Shtyrov, & E. Brattico, (eds.), Language Electrified. Techniques, Methods, Applications, and Future Perspectives in the Neurophysiological Investigation of Language. Springer. https://doi.org/10.31234/osf.io/3utpv

5.B OPEN ACCESS

In order to optimize the impact of publicly-funded research both at European and national levels, and since it is essential to enhance economic returns and improve competitiveness through knowledge, in 2016 BCBL launched its "Open Access" policy so that results of publicly-funded research get disseminated broader and faster in the benefit of researchers, the innovation field, and society in general.
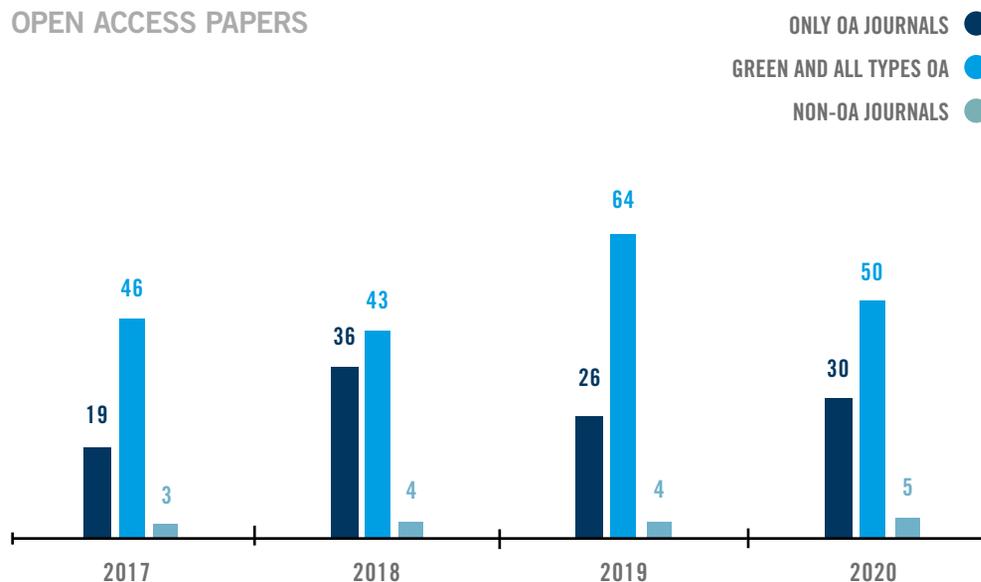
To this end, BCBL has made an agreement with the University of the Basque Country (UPV/EHU) to use ADDI (Archivo Digital para la Docencia y la Investigación) as its official repository to register all the scientific production of the center since January 2016.

ADDI is the digital archive for learning and research materials of the University of the Basque Country (UPV/EHU). It is designed to organize,

archive, preserve and disseminate via open access the intellectual output resulting from the teaching and research activities, including PhD theses, Master's theses, end-of-degree projects, scientific papers, dissertations, book chapters, teaching material, etc.

OPEN ACCESS PAPERS

ONLY OA JOURNALS ●
GREEN AND ALL TYPES OA ●
NON-OA JOURNALS ●

	2017	2018	2019	2020
Only OA journals	19	36	26	30
Green and all types OA	46	43	64	50
Non-OA journals	3	4	4	5

PARTICIPATION IN
CONFERENCES 2017-2020

POSTER PRESENTATIONS ●
ORAL PRESENTATIONS ●
INVITED TALKS ●

	2017	2018	2019	2020
Poster Presentations	46	49	68	65
Oral Presentations	24	28	38	16
Invited Talks	48	44	26	13
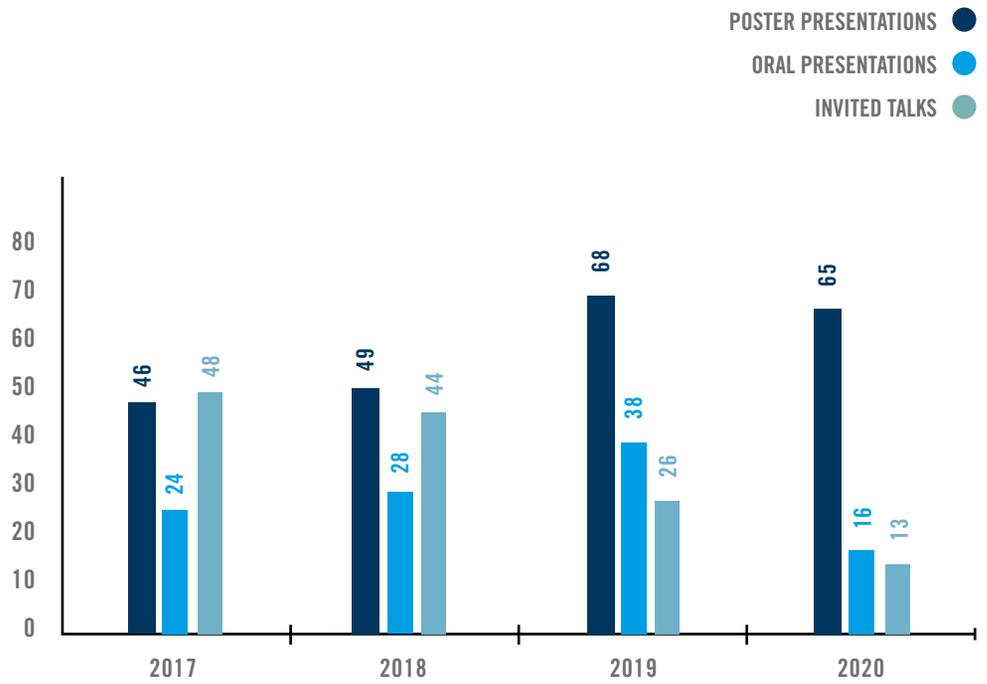
2017

Poster Presentations

1. Antón, E., Thierry, G., Dimitropoulou, M., & Duñabeitia, J.A. (March, 2017). Learning by mixing languages: electrophysiological and behavioral consequences. Poster presentation at the ICPS 2017 conference in Vienna, Austria.

2. Arnaez-Telleria, J., Carreiras, M., & Paz-Alonso, P.M. (November, 2017). Testing leads to consolidated-like memories. Poster presentation at the Society for Neuroscience Meeting 2017, Washington DC, USA.

3. Arnaez-Telleria, J., Oliver, M., Carreiras, M., & Paz-Alonso, P.M. (November, 2017). Spontaeous fluctuations of dorsal and ventral reading networks in bilinguals. Poster presentation at the Ninth Annual meeting of the Society for the Neurobiology of Language (SNL 2017), Baltimore, MD, USA.

4. Baart, M., & Vroomen, J. (December 14-16, 2017). Hearing an emotional face: Visual emotion recalibrates auditory perception. Poster presentation at NVP Winter Conference, Egmond aan zee, the Netherlands.

5. Borragan, M., Martin, C.D., & Duñabeitia, J.A. (April, 2017). Exploring language inhibition during multitasking. Poster presentation at the International Symposium of Psicholinguistics (ISP), Braga, Portugal.

6. Bortfeld, H., Shaw, K. E., & Baart, M. (May, 2017). Infant sensitivity to audiovisual timing driven by articulator-speech sound relationship. Poster presentation at the 18th International Multisensory Research Forum (IMRF), Nashville, USA.

7. Caballero-Gaudes, C., Ezama, O., Delgado-Alvarado, M., & Rodriguez-Oroz, M.C. (24-28 June, 2017). Investigating the feasibility of classifying independent components in resting state BOLD fMRI with sparse paradigm free mapping. Poster presentation at the Annual Meeting of the Organization of Human Brain Mapping, Vancouver, Canada.

8. Caffarra, S., & Martin, C.D. (June, 2017). When we can tolerate a morphosyntactic error: an ERP study on non-native accented speech. Poster presentation at the International Morphological Processing Conference (MoProc 2017), Trieste, Italy.

9. Caffarra, S., Mendoza, M., & Davidson, D. (August 5-8, 2017). Is the LAN effect an ERP artifact? Poster presentation at the 13th International Conference for Cognitive Neuroscience, Amsterdam, Netherlands.

10. Costello, B., Paz-Alonso, P.M., & Carreiras, M. (September, 2017). Neural correlates underlying sign language processing in hearing bilinguals. Poster presentation at the 20th ESCoP conference (ESCOP 2017), Potsdam, Germany.

11. Costello, B., Paz-Alonso, P.M., & Carreiras, M. (November, 2017). Neural signatures of sign language processing in bimodal bilinguals. Poster presentation at the Ninth Annual meeting of the Society for the Neurobiology of Language (SNL 2017), Baltimore, MD, USA.

12. Costello, B., Paz-Alonso, P.M., & Carreiras, M. (November, 2017). The neural basis of sign language processing: Evidence from hearing bimodal bilinguals. Poster presentation at the Society for Neuroscience Meeting 2017, Washington DC, USA.

13. de Bruin, A., Samuel, A.G., & Duñabeitia, J.A. (November, 2017). Bilingual language switching across the lifespan. Poster presentation at the 58th Annual Meeting of the Psychonomic Society, Vancouver, Canada.

14. Dias, P., Villameriel, S., Caffara, S., Costello, B. & Carreiras, M. (September, 2017). The neurophysiological signature for reading in deaf adults. Poster presentation at the 20th ESCoP conference (ESCoP 2017), Potsdam, Germany.

15. Frances, C., & Duñabeitia, J. A. (September, 2017). Ew! Disgust perception in native and foreign languages. Poster presentation at the 20th ESCoP Conference (ESCoP 2017), Potsdam, Germany.

16. Guediche, S., Samuel, A.G., & Baart, M. (November, 2017). Effects of Semantic Context and Crosslinguistic interactions, on Non-native Word Recognition in Noise. Poster presentation at the 58th Annual Meeting of the Psychonomic Society, Vancouver, Canada.

17. Giezen, M.R., & Carreiras, M. (June, 2017). Phonological priming across languages in deaf and hearing bilinguals of Spanish Sign Language and Spanish. Poster presentation at the 11th International Symposium on Bilingualism (ISB), Limerick, Ireland.

18. Iglesias, J.E., Insausti, R., Lerma-Usabiaga, G., Van Leemput, K., Ourselin, S., Fischl, B., Caballero-Gaudes, C,. & Paz-Alonso. P.M. (June, 2017). A probabilistic atlas of the thalamic nuclei combining ex vivo MRI and histology. Poster presentation at SfN annual meeting, Washington, D.C., USA.

19. Ivaz, L., & Duñabeitia, J. A. (September, 2017). How late do foreign languages catch our (visual) attention? Poster presentation at the 20th ESCoP conference (ESCOP 2017), Potsdam, Germany.

20. Kapnoula, E.C., & Samuel. A.G. (September 3-6, 2017). Information about the talker's voice can affect word meaning. Poster presentation at the 20th ESCoP conference (ESCOP 2017), Potsdam, Germany.

21. Kapnoula, E.C., & Samuel. A.G. (November, 2017). Information about talker's voice can affect word meaning. Poster presentation at the 20th Meeting of the European Society for Cognitive Psychology (ESCoP 2017), Potsdam, Germany.

22. Kapnoula, E.C., & Samuel. A.G. (November, 2017). Talker's voice can affect word meaning: Evidence from eye movements. Poster presentation at the 58th Annual Meeting of the Psychonomic Society, Vancouver, Canada.

23. Kartushina, N., Baart, M., & Martin, C.D. (September 2017). The role of stimulus variability in non-native sound production learning: evidence from behavioral and neuronal measures. Poster presentation at the 20th Meeting of the European Society for Cognitive Psychology (ESCoP 2017), Potsdam, Germany.

24. Lerma-Usabiaga, G., Carreiras, M. & Paz-Alonso, P.M. (March, 2017). Multimodal characterization of ventro-occipito-temporal reading regions. Poster presentation at the 2017 meeting of the Cognitive Neuroscience Society (CNS 2017), San Francisco, California, USA.

25. Lerma-Usabiaga, G., Carreiras, M., & Paz-Alonso, P.M. (June, 2017). Functional characterization of ventro-occipito-temporal reading regions. Poster presentation at Organization for Human Brain Mapping (OHBM 2017), Vancouver, Canada.

26. Lerma-Usabiaga, G., Carreiras, M., & Paz-Alonso, P.M. (November 8–10, 2017). Multimodal MRI converging evidence on the role of ventro-occipito-temporal cortex in reading: Integrating opposing views. Poster presentation at the 9th meeting of the Society for the Neurobiology of Language (SNL 2017), Baltimore, USA.

27. Martin, C.D., Pérez, A., & Caffarra, S. (November 2017). Electrophysiological activity in native, dialectal and foreign accented speech processing. Poster presentation at the Ninth Annual meeting of the Society for the Neurobiology of Language (SNL 2017), Baltimore, MD, USA.

28. Marín-García, E., & Paz-Alonso, P.M. (August, 2017). Language use in true and false DRM memories: An fMRI study comparing monolinguals and bilinguals. Poster presentation at ICON 2017, Amsterdam, The Netherlands.

29. Medeiros, J., & Armstrong, B. (July, 2017). Semantic ambiguity effects: A matter of time? Poster presentation at 39th Annual Meeting of the Cognitive Science Society, London, UK.

30. Medeiros, J., & Armstrong, B.C* (2017, November). Are semantic ambiguity effects modulated by response latency? Insights from lexical decision. Poster presentation at the 58th Annual meeting of the Psychonomic Society, Vancouver, Canada.

31. Molinaro, N., Lizarazu, M., Bourguignon, M, & Zarraga, A. (August, 2017). Do we need meaning to brain-synchronize to speech? Poster presentation at the 13th International Conference for Cognitive Neuroscience (ICON 2017), Amsterdam, the Netherlands.

32. Monsalve, I.F., & Molinaro, N. (2017). Visual wordform preactivation: differential response to long vs short words starts before stimulus onset. Poster presentation at the 13th International Conference for Cognitive Neuroscience (ICON 2017), Amsterdam, the Netherlands.

33. Nara,S., Zarraga, A., Bourguignon, M., & Molinaro, N. (December, 2017). Predicting visual percepts: MEG evidence. Poster presentation at the Brain Modes 2017, NBRC, Manesar, India.

34. Oliver, M., Carreiras, M., & Paz-Alonso, P.M. (March, 2017). Neural correlates of word frequency effects in bilinguals. Poster presentation at the CNS 2017, San Francisco, CA, US.

35. Ordin, M. (July 2017). Speech rhythm in ontogenesis as an analogue window on speech rhythm in phylogenesis and speech evolution. Poster presentation at the 7th International Conference on Speech Motor Control, section on Evolution of Speech, Groningen, the Netherlands.

36. Ormel, E., Giezen, M.R., Van Diggelen, E.M., Klomp, U., Buts, K., & Van Zuilen, M. (June, 2017). Cognitive control in deaf and hearing bimodal bilingual children. Poster presentation at the 11th International Symposium on Bilingualism (ISB), Limerick, Ireland.

37. Ostiz-Blanco, M. (November, 2017). Videojuegos y música para ayudar a las personas. Poster presentation at the 7° ENCUENTRO DE VIDAS CIENTIFICAS, Museo de la ciencia Eureka! San Sebastian, Spain.

38. Paz-Alonso, P.M., & Arnaez-Telleria, J. (June, 2017). Neurodevelopmental correlates of the retrieval-practice effect. Poster presentation at the annual meeting of the Organization for the Human Brain Mapping (OHBM 2017), Vancouver, Canada.

39. Polyanskaya, L. (April, 2017). Retained memory traces of a lost language can influence the perception of foreign accent. Poster presentation at International Symposium on Psycholinguistics, Braga, Portugal.

40. Polyanskaya, L., Ordin, M. (April, 2017). Non-native speech rhythm can contribute to accentedness of L2 speech only when the target and native languages of the learner are rhythmically contrastive. Poster presentation at International Symposium on Psycholinguistics, Braga, Portugal.

41. Quiñones I., Molinaro N., Barber H., & Carreiras M. (March, 2017). Tracing the interplay between syntactic and lexical features: fMRI evidence from agreement comprehension. Poster presentation at the 2017 meeting of the Cognitive Neuroscience Society (CNS 2017), San Francisco, California, USA.

42. Ristic, B., Mancini, S., & Molinaro, N. (April, 2017). How to influence the verb number without disrupting it. Poster presentation at CUNY, Boston, USA.

43. Soto, D., Theodoraki, M., & Paz-Alonso, P.M. (September 6-8, 2017). How the human brain introspects about one's own cognition and behavior. Poster presentation at the Conference on Cognitive Computational Neuroscience (CCN), Columbia University in New York, USA.

44. Vergara-Martinez, M., Carreiras, M., Gutierrez-Sigut, E., Gil, C., & Perea, M. (March 2017). When Script met Sally: An ERP study on the impact of lexical processing during the early encoding of handwritten words. Poster presentation at the 2017 meeting of the Cognitive Neuroscience Society (CNS 2017), San Francisco, California, USA.

45. Villameriel, S., Dias P., Giezen, M., Costello, B. & Carrerias, M. (September, 2017). Language modality shapes the dynamics of lexical access: Word and sign recognition in bimodal bilinguals. Poster presentation at the 20th ESCoP Conference (ESCoP 2017), Potsdam, Germany.

46. Zarraga, A., Bourguignon, M., Lizarazu. M, Molinaro, N. (August, 2017). Audiovisual speech integration in predictive vs. non-predictive visual conditions. Poster presentation at the 2017 conference of International conference for Cognitive Neuroscience (ICON), Amsterdam, The Netherlands.

Oral Presentations

1. Bañón, J.A., & Martin, C.D. (November, 2017). Second Language Learners Generate Predictions at the Level of the Discourse: Evidence from Event-related Potentials. Oral presentation at the Boston University Conference on Language Development, Boston, USA.

2. Carreiras, M., Costello, B., Dias, P., Duñabeitia, J.A., Fariña, N., & Villameriel, S. (February, 2017). Leyendo el cerebro: la lectura de las personas sordas. Oral presentation at 1er Congreso Internacional sobre Escritura y Sordera (CIES), Jerez de la Frontera, Spain.

3. de Bruin, A., Samuel, A. G., & Duñabeitia, J. A. (September, 2017). Voluntary language switching: When and why do bilinguals switch between languages? Oral presentation at the 20th ESCoP Conference (ESCoP 2017), Potsdam, Germany.

4. Dias, P., Costello, B., Carreiras, M. (June, 2017). Reading a language never heard: EEG evidence for reading comprehension in deaf people. Oral presentation at World Congress on Brain Behavior and Emotion (BRAIN), Porto Alegre, Brazil.

5. Dias, P., & Fariña, N. (May 16, 2017). ¿Cómo leer una lengua que nunca has escuchado? Oral presentation at Pint of Science Alboka bar, San Sebastian, Spain.

6. Garcia-Penton, L., Duñabeitia, J.A., & Carreiras, M. (April, 2017). Is there a bilingual advantage in executive function? Oral presentation at XIII International Symposium of Psycholinguistics, Braga, Portugal.

7. Guediche, S. (May 17, 2017). "Nose" or "noise"? Sniffing out words in a crowd. Oral presentation at Pint of Science Alboka bar, San Sebastian, Spain.

8. Heinzova, P. (May 16, 2017). How to detect bullshit in cognitive neuroscience. Oral presentation at Pint of Science Alboka bar, San Sebastian, Spain.

9. Ivaz, L., Costa, A., & Duñabeitia, J. A. (April, 2017). This is foreign to me: self-perception and non-native languages. Oral presentation at the sub-symposium Language and Emotion at the XIII International Symposium of Psycholinguistics, Braga, Portugal.

10. Kartushina, N. (May 17, 2017). Acento extranjero: mitos y realidad. Oral presentation at Pint of Science Alboka bar, San Sebastian, Spain.

11. Kartushina, N. & Martin, C. (June, 2017). Processing variability in L2 learning: insights from articulatory training. Oral presentation at the Bilingualism vs. monolingualism: A new perspective to limitations on L2 acquisition workshop, Toulouse, France.

12. Lallier, M., Molinaro, N., Lizarazu, M., Bourguignon, M., & Carreiras, M. (May, 2017). Atypical oscillatory Activity in Developmental Dyslexia. Oral presentation in Integrated Symposium: New insights on typical and atypical reading development from brain and intervention studies, at 5th International Congress of Educational Sciences and Development, Santander, Spain.

13. Lerma-Usabiaga, G., Carreiras, M., & Paz-Alonso, P.M. (November 11-15, 2017). Anterior-posterior gradient within ventro-occipito-temporal reading regions: Functional and structural MRI converging evidence. Oral presentation at 47th annual meeting of the Society for Neuroscience (SfN 2017), Washington DC, USA.

14. Martin, C.D., Caffarra, S., Schloeffel, S., Antzaka, A., Lallier, M., & Carreiras, M. (September 2017). Cognate effect in noise: Selective activation of the unattended language in bilingual word recognition. Oral presentation at the 20th ESCoP Conference (ESCoP 2017), Potsdam, Germany.

15. Martin, C.D., Pérez, A., & Caffarra, S. (September 2017). Dialectal and foreign accented speech processing: Electrophysiological evidence for the Perceptual Distance Hypothesis. Symposium at the 20th ESCoP Conference (ESCoP 2017), Potsdam, Germany.

16. Ordin, M., Polyanskaya, L., & Gomez, D. (April, 2017). The role of native language and of the general auditory properties in detecting rhythmic changes. Oral presentation at International Symposium on Psycholinguistics, Braga, Portugal.

17. Pejovic, J., Yee, E., & Molnar, M. (December, 2017). Audiovisual speech processing in monolingual and bilingual infants: The attentional shift between 4 and 8 months of age. Oral presentation at the Developmental workshop on Bilingual First Language Acquisition: current theories and methodologies, BAAL 2017. York, UK.

18. Pourquié, M., & Munarriz, A. (February 8, 2017). Basque adaptation of the Comprehensive Aphasia Test. Oral presentation at the Final COST conference: Collaboration of Aphasia Trialists, Erasmus University Medical Center, Rotterdam, Netherlands.

19. Ríos-López, P., Molinaro, N., & Lallier, M. (July 12-15, 2017). Exploring reading readiness in pre-schoolers: Rhythmic abilities predict brain sensitivity to orthographic stimuli in the N100 window before formal reading instruction. Oral presentation at SSSR meeting 2017 in Halifax, Canada.

20. Soto, D. (January 6, 2017). How the human brain replays prior attentional episodes. Oral presentation at the Experimental Psychology Society Meeting, London, UK.

21. Soto, D. (May 15, 2017). El cerebro inconsciente. Oral presentation at Pint of Science Alboka bar, San Sebastian, Spain.

22. Sampedro, M.A., Dias, P., Fariña, N., Villarmeriel, S., Costello, B., Giezen, M. Carreiras, M. (October, 2017). Explorando el léxico de la LSE. Oral presentation at the Congreso CNLSE (Centro de Normalización Lingüística de la Lengua de Signos Española 2017, Madrid, Spain.

23. Samuel, A.G., & Marin-Garcia, E. (November, 2017). Activation of Embedded Words: Evidence from Eye Tracking and Long Term Priming. Oral presentation at the 58th Annual Meeting of the Psychonomic Society, Vancouver, Canada.

24. Zugarramurdi, C. (May 15, 2017). Leyendo al ritmo del cerebro. Oral presentation at Pint of Science Alboka bar, San Sebastian, Spain.

Invited Talks

1. Bergouignan, L. (March 14-16, 2017). Does the body take part in amnesia symptoms? Invited talk at the Jean Louis Ségnoret Congress 2017 on Amnesia Symptoms, Caen, France.

2. Caballero-Gaudes, C. (June 25, 2017). Overview of noise in fMRI. Invited talk at Educational course Advanced Methods for Cleaning up fMRI Time-Series, Organization for Human Brain Mapping (OHBM 2017), Vancouver, Canada.

3. Caffarra, S. (June, 2017). The weighting of formal cues during agreement processing: does language experience matter? Invited talk at the Workshop on Syntax Processing, Rovereto, Italy.

4. Caffarra, S., Mendoza, M., & Davidson, D. (December, 2017). The Left Anterior Negativity: Artifact or real ERP effect? Invited talk a University of La Laguna, Spain.

5. Carreiras, M. (January 27-28, 2017). Neurociencia y educación: aprendizaje, marcadores tempranos y neuromitos. Invited talk at "Simposio de Educación Cognición y Neurociencia", Huelva, Spain.

6. Carreiras, M. (March 16-19, 2017). Neurociencia, Lenguaje y Educación. Invited talk at "I Congreso Nacional en Atención Temprana: Retos educativos, sociales, tecnológicos y de la salud en Atención Temprana", Montevideo, Uruguay.

7. Carreiras, M. (April 2-5, 2017). The bilingual brain: plasticity and processing form cradle to grave. Invited talk at LaP2017 3rd Learning and Plasticity Meeting, Äkäslompolo, Finland.

8. Carreiras, M. (May 5, 2017). Lenguaje: mecanismos cognitivos y neurales. Invited talk at Universidad Santiago de Compostela, Santiago de Compostela, Spain.

9. Carreiras, M. (June 2017). Language and cognition evaluation in awake brain surgery. Invited talk at Osakidetza / European Low grade Glioma Network, Bilbao, Spain.

10. Carreiras, M. (July 2017). The bilingual brain: Plasticity and processing from cradle to grave. Invited talk at 7th IMPRS NeuroCom Summer School, London, UK.

11. de Bruin, A. (May 30, 2017). Language switching and executive control in younger and older adults. Invited talk at the University of Groningen, the Netherlands.

12. de Bruin, A. (10 October 2017). To switch or not to switch: When and why do bilinguals switch between their languages? Invited talk at the University of Reading, UK.

13. Dias, P. (June 6, 2017). Reading a language never heard: EEG evidence for reading comprehension in deaf people. Invited talk at the Brain Institute (Inscer), Porto Alegre, Brazil.

14. Dias, P. (June 7, 2017). Reading a language never heard: EEG evidence for reading comprehension in deaf people. Invited talk at the Pontifical Catholic University of Rio Grande do Sul, School of Psychology and Medicine. Porto Alegre, Brazil.

15. Dias, P. (June 9, 2017). Parallel language activation and language control in Bimodal Bilinguals. Invited talk at the Pontifical Catholic University of Rio Grande do Sul, School of Linguistics. Porto Alegre, Brazil.

16. Duñabeitia, J.A. (March 7, 2017). Neurociencia cognitiva y altas capacidades. Invited talk at the Congreso Altas Capacidades en la Escuela Inclusiva, Santander, Spain.

17. Duñabeitia, J.A. (April 1, 2017). Emociónale. Invited talk at the IV Xornadas Galegas de Linguas Estranxeiras from Xunta de Galicia, Santiago de Compostela, Spain.

18. Duñabeitia, J.A. (April 22, 2017). Neurociencia y bilingüismo. Invited talk at the Jornadas ELE Junto al Báltico 2017, Tallin, Estonia.

19. Duñabeitia, J.A. (April 27, 2017). Neurociencia y coaching para el aula de idiomas. Invited talk at the CFPI of the Junta de Castilla y León, Valladolid, Spain.

20. Duñabeitia, J.A. (June, 2017). Morphology and Neuroscience. Invited talk at the International Morphological Processing Conference MoProc 2017, Trieste, Italy.

21. Duñabeitia, J.A. (June 29, 2017). The multilingual school: where are we and where should we go? Invited Summer Lecture at the Institute of Education of the University College London (UCL), London, UK.

22. Fariña, N. (June 9, 2017). "Lenguaje, cerebro y las personas sordas". Invited talk at the Deaf Federation of Castilla-León, Valladolid, Spain.

23. Fariña, N., Costello, B. & Giezen, M. (March 6, 2017). Lenguaje, cerebro y las personas Sordas. Invited talk given at Arabako Gorrak [The Araba Association of Deaf People], Vitoria-Gasteiz, Spain.

24. Kapnoula, E.C. (June, 2017). Is it a word yet? Discussing the definition of lexicality in the context of word learning. Invited talk at the Workshop on Conversational Speech and Lexical Representations, Nijmegen, The Netherlands.

25. Lallier M. (May, 2017). Reading development in early bilinguals. Keynote speaker at the International Conference on Interfaces in Linguistics, Université Toulouse-Jean Jaurès. Toulouse, France.

26. Lallier, M. (June, 2017). Neuroaprendizaje de la lectoescritura y detección temprana de la dislexia. Invited talk at XI Jornadas Educativas Apsid, Bilbao, Spain.

27. Lallier, M. (December 11, 2017). ¿Cómo la sensibilidad al ritmo moldea el cerebro lector? Invited talk at Ciclo de conferencias de la Facultad de Psicología. Universidad Autonoma de Barcelona, Barcelona, Spain.

28. Lallier, M. (December 15, 2017). Reading acquisition in bilinguals. Invited talk at Seminar series of the SCALab, Université de Lille, France.

29. Mancini, S. (June 5-6, 2017). Agreement and (illusion of) disagreement: reconciling theoretical analyses and sentence processing data. Invited talk at Workshop on Syntax Processing, Rovereto, Italy.

30. Martin, C.D. (July 11, 2017). El cerebro eléctrico percibe el lenguaje. Invited talk at UPV Summer courses: "Una aventura científica: De las partículas elementales al conocimiento". Donostia, Spain.

31. Molinaro, N. (March 27, 2017). Low-Frequency Oscillations Mediate Top-Down Activity During Speech Processing. Invited talk at CNS 2017, San Francisco, CA, USA.

32. Molinaro, N. (September 2017). Do developmental dyslexics tune to the sounds? Invited talk at Psychology seminar series at Oxford Brookes University, Oxford, UK.

33. Munarriz, A., & Pourquié, M. (May 10, 2017). CAT: afasia aztertzeko tresnaren euskal egokitzapena. [CAT:Basque adaptation of the Comprehensive Aphasia Test.] Invited talk at IkerGazte, NPU-Public University of Navarre, Pamplona, Spain.

34. Ostiz, M. (April 7, 2017). ¿Está creando la tecnología una nueva humanidad? Invited talk at VI Olimpiada de Filosofía de Navarra, Universidad de Navarra, Pamplona, Spain.

35. Paz-Alonso, P.M. (November, 2017). Neurodevelopmental basis of higher cognitive functions. Biological basis of "Bases neurobiológicas del desarrollo de funciones cerebrales superiores". Keynote talk at the XXXV meeting of the Society of Psychiatry and Neurology of Childhood and Adolescence. Pucón, Chile.

36. Paz-Alonso, P.M. (November, 2017). Converging evidence underlying the role of thalamus in dyslexia; Development of a probabilistic atlas of the human thalamus. Invited talk at the Medical School, Pontificia Universidad Católica de Chile. Santiago, Chile.

37. Pourquié, M. (January 17, 2017). "fLEX: flexioa eta lexikoaren aztertzeko aplikazio eleanizduna euskaraz, frantsesez eta gaztelaniaz. Motibazioa, helburuak eta erabilera." [fLEX : a multilingual application for assessing inflection and lexicon in Basque, French and Spanish. Motivation, objectives and usability]. Invited talk at Elebilab Bilingualism lab, EHU, Vitoria-Gasteiz, Spain.

38. Soto, D. (February 2017). Brain mechanisms of human consciousness. Invited talk at conference series initiated by Jakiunde to enhance young's people intellectual and personal development. Jakin-mina, San Sebastián, Spain.

39. Soto, D. (February 23, 2017) Non-conscious working memory. Invited talk at the Department of Experimental Psychology, University of Oxford, UK.

40. Villameriel, S. (February 18, 2017). Lengua de signos, cerebro y adquisición. Invited talk at Centro Cultural de Personas Sordas de Palencia, Palencia, Spain.

41. Villameriel, S. (January 31, 2017). Cerebro y lengua de signos, adquisición y bilingües bimodales. Invited talk at the Centro López Vicuña, Palencia, Spain.

42. Villameriel, S. (January 31, 2017). Cerebro y lengua de signos, adquisición y bilingües bimodales. Invited talk at the Centro San Viator, Valladolid, Spain.

43. Villameriel, S. (March 31, 2017). Lengua de signos, cerebro y bilingües. Invited talk at 30 Aniversario de la Escuela Oficial de Idiomas de Palencia, Palencia, Spain.

44. Villameriel, S. (June 9, 2017). La investigación en lengua de signos, personas sordas y bilingües bimodales. Invited talk at the Jornadas CFGS ILSE, 13 años de historia, Las Palmas de Gran Canaria, Spain.

45. Villameriel, S. (October 20, 2017). Procesamiento de la lengua de signos y bilingües bimodales. ¿Cómo accedemos a los signos en nuestra mente? Invited talk at Universitat Pompeu Fabra, Barcelona.

46. Villameriel, S. (December 18, 2017). La lengua de signos en el cerebro y la investigación en personas sordas y bilingües bimodales. Invited talk at Centro López Vicuña, Palencia, Spain.

47. Wilson, L.B. (September 25, 2017). Breaking the Wall of Autism. Invited talk at Falling Walls Lab: Marie Sklodowska-Curie Actions, House of European History, Brussels, Belgium.

48. Zugarramurdi, C. (December 11, 2017). Educación, alfabetización, lectura y escritura en la educación inicial y primaria. Invited talk at Centro Interdisciplinario en Cognición para la Enseñanza y el Aprendizaje (CICEA) de la Universidad de la República (Udelar), Montevideo,Uruguay.

2018

Poster Presentations

1. Abrahamse, E.L., Merhej, D., & Paz-Alonso, P.M. (July, 2018). Hippocampus: reading beyond the reading network. Poster presentation at the SEPEX-SEPNECA conference, Madrid, Spain.

2. Alemán Bañón, J.A., & Martin, C.D. (March, 2018). Can second language learners generate predictions at the level of the discourse? An event-related potentials study. Poster presentation at 31st CUNY Conference on Human Sentence Processing, Cuny 2018, Davis, USA.

3. Amoruso, L., & Urgesi, C. (November 15-17, 2018). Differential contribution of spatial frequency information in the comprehension of naturalistic actions. Poster presentation at the XXVI National Congress of the Italian Society for Psychophysiology, Turin, Italy.

4. Arnaez-Telleria, J., Carreiras, M., & Paz-Alonso, P.M. (March, 2018). Consolidated-like memories through testing. Poster presentation at the Cognitive Neuroscience Society (CNS 2018) annual meeting, Boston, USA.

5. Arredondo, M., May, L., Gervain, J., Carreiras, M., & Werker, J. (June, 2018). Left hemisphere specialization for familiar language at 4-months. Poster presentation at ICIS 2018, the International Congress of Infant Studies (ICIS), Philadelphia, USA.

6. Baart, M., Keetels, M., & Vroomen, J. (June, 2018). Recalibration of vocal affect by a dynamic or static face. Poster presentation at the 19th Annual International Multisensory Research Forum (IMRF), Toronto, Canada.

7. Baart, M., & Vroomen, J. (May, 2018). Lip-read speech but not sentential context produces top-up effect on lexical bias. Poster presentation at the Psychonomics International meeting, Amsterdam, the Netherlands.

8. Biondo, N., Bergamini, E., & Vespignani, F. (March, 2018). Distance matters during adverb-verb tense processing: evidence from ERPs. Poster presentation at 31st CUNY Conference on Human Sentence Processing, Cuny 2018, Davis, USA.

9. Blanco, B., Molnar, M., & Caballero-Gaudes, C. (October, 2018). Effect of prewhitening in resting state functional near infrared spectroscopy data. Poster presentation at the fNIRS 2018 biennial meeting of the Society for fNIRS, Tokyo, Japan.

10. Blanco, B., Molnar, M., Caballero-Gaudes, C., & Carreiras, M. (October, 2018). Cortical network development in monolingual and bilingual infants. Poster presentation at the fNIRS 2018 biennial meeting of the Society for fNIRS, Tokyo, Japan.

11. Burgering, M. A., Baart, M., & Vroomen, J. (June, 2018). Audiovisual recalibration and selective adaptation for vowels and speaker sex. Poster presentation at the 19th Annual International Multisensory Research Forum (IMRF), Toronto, Canada.

12. Caballero-Gaudes, C., Bandettini, P., & Gonzalez-Castillo, J. (April 5, 2018). A temporal deconvolution algorithm for multiecho functional MRI. Poster presentation at IEEE International Symposium of Biomedical Imaging, ISBI 2018, Washington DC, USA.

13. Caballero-Gaudes, C., Gonzalez-Castillo, J., & Bandettini, P. (June 16-21, 2018). Improved detection of neuronal-related BOLD events of unknown timing with Multi-Echo Sparse Paradigm Free Mapping. Poster presentation at the Annual Meeting of the International Society of Magnetic Resonance in Medicine, ISMRM 2018, Paris, France.

14. Caballero-Gaudes, C., Moia, S., Bandettini, P., & Gonzalez-Castillo, J. (September 16-20, 2018). Quantitative deconvolution of fMRI data with Multiecho Sparse Paradigm Free Mapping. Poster presentation at MICCAI 2018, Granada, Spain.

15. de Bruin, A., Kapnoula, E., & Duñabeitia, J. A. (November, 2018). Examining conflict adaptation across Stroop and semantic interference tasks: An eye-tracking study. Poster presentation at Poster presentation at the 59th Annual Meeting of the Psychonomic Society (Psychonomics 2018), New Orleans, USA.

16. de Dios-Flores, I. (September, 2018). Interference in the processing of grammatical sentences: the case of multiple negation. Poster presentation at Architectures and Mechanisms for Language Processing, AMLaP 2018, Berlin, Germany.

17. Frances, C., De Bruin, A., & Duñabeitia, J.A. (September 21-23, 2018). Learning Emotional Concepts in a Foreign or a Native Languag. Poster presentation at CoNSALL Conference, Bangor, UK.

18. Geng, S., Amoruso, L., Timofeeva, P., Gil Robles, S., Pomposo, I., Molinaro, N., & Carreiras, M. (August, 2018). Oscillatory dynamics during lexico-semantic retrieval: Evidence for neuroplasticity of language in patients with left-hemisphere temporal tumors. Poster presentation at 10th Anniversary of the Society for the Neurobiology of Language (SNL 2018), Québec, Canada.

19. Gisbert-Muñoz, S., Quiñones, I., & Carreiras, M. (August, 2018). Network selectively responding to bilingual sentence comprehension vary as a function of the L2 age of acquisition. Poster presentation at the 2018 meeting of the Society for the Neurobiology of Language (SNL 2018), Québec, Canada.

20. Gonzalez-Castillo, J., Caballero-Gaudes, C., & Bandettini, P.A. (November, 2018). Pseudo-Quantitative Deconvolution of Neuronal-related BOLD events with unknown timing. Poster presentation at the 2018 annual meeting of the Society for Neuroscience (SfN 2018), San Diego, USA.

21. Guediche, S., Baart, M., & Samuel, A.G. (November 15-18, 2018). How changes in brain activity are modulated by semantic priming, crosslinguistic phonological overlap, and their interaction, during second language (L2) word recognition in noisy listening conditions. Poster presentation at Poster presentation at the 59th Annual Meeting of the Psychonomic Society (Psychonomics 2018), New Orleans, USA.

22. Guediche, S., de Bruin, A., Baart, M., & Samuel, A.G. (November 3-7, 2018). L2 word recognition in noise: modulatory effects of semantic and crosslinguistic overlap on brain activity. Poster presentation at the 2018 Meeting of the Society for Neuroscience (SfN 2018), San Diego, USA.

23. Gurunandan, K., Carreiras, M., & Paz-Alonso, P.M. (August, 2018). Neural plasticity of speech and reading networks associated with language learning. Poster presentation at the 2018 meeting of the Society for the Neurobiology of Language (SNL 2018), Québec City, Canada.

24. Gurunandan, K., Rueda, M.R., Guerra, S., Carreiras, M., & Paz-Alonso, P.M. (March, 2018). Metacognitive training induces neurodevelopmental changes in prefrontal regions. Poster presentation at the Cognitive Neuroscience Society (CNS 2018) annual meeting. Boston, USA.

25. Herrero-Roldán, S., Quiñones, I., Rodrigo, M.J., Hernandez-Cabrera, J.A., & León, I. (10-12 May, 2018). Altered crying face processing as a common neural link between childhood maltreatment and neglectful mothering. Poster presentation at the Psychonomics International meeting, Amsterdam, The Netherlands.

26. Iglesias, J.E., Insausti, R., Lerma-Usabiaga, G., Artacho-Figueroa, G., Van Leemput, K., Ourselin, S., Fischl, B., Caballero-Gaudes, C., & Paz-Alonso. P.M. (February 18 - 23, 2018). A probabilistic atlas of the thalamic nuclei combining ex vivo MRI and histology. Poster presentation at the Thalamocortical Interactions Gordon Research Conference, Lucca, Italy.

27. Jevtović M., Duñabeitia, J. A., & de Bruin, A.(December, 2018). How do bilinguals switch between languages in different interactional contexts? Poster presentation at the Conference on Multilingualism, Ghent, Belgium.

28. Lallier, M., Martin, C., Acha, J., & Carreiras, M. (April, 2018). Bilingualism modulates the orthographic grain size: Evidence in early Basque bilingual children. Poster presentation at the International Conference of the British Dyslexia Association, Telford, UK.

29. Lerma-Usabiaga, G., Carreiras, M., & Paz-Alonso (July, 2018). Multimodal characterization of ventro-occipito-temporal reading regions. Poster presentation at the SEPEX-SEPNECA conference, Madrid, Spain.

30. Lerma-Usabiaga, G., Glozman, T., & Wandell, B. (November 3-7, 2018). Interhemispheric similarities between diffusion measures of human brain white matter tracts. Poster presentation at the 2018 Meeting of the Society for Neuroscience (SfN 2018), San Diego, USA.

31. Lindborg, A., Baart, M., & Andersen, T. S. (June, 2018). Electrophysiological evidence for differences between fusion and combination illusions in audiovisual speech perception. Poster presentation at the 19th Annual International Multisensory Research Forum (IMRF), Toronto, Canada.

32. Lopez-Zunini, R.A., Armstrong, B.C., Baart, M., & Samuel, A.G. (May, 2018). Processing dynamics of hearing and seeing words under (no) time pressure: Insights from behaviour, ERPs and mixed-effect models. Poster presentation at the Psychonomics International meeting, Amsterdam, the Netherlands.

33. Mancini, S., Wolpert, M., Scarinci, D., & Caffarra, S. (March, 2018). Impact of interlocutor identity on grammatical processing: the case of Basque allocutive. Poster presentation at 31st CUNY Conference on Human Sentence Processing, Cuny 2018, Davis, USA.

34. Mancini, S., Wolpert, M., Scarinci, D., & Caffarra, S. (September, 2018). Addressee identity and grammatical processing: the case of basque allocutive agreement. Poster presentation at Architectures and Mechanisms for Language Processing, AMLaP 2018, Berlin, Germany.

35. Marin-Garcia, E., & Paz-Alonso, P.M. (Mach, 2018). Neural interactions between memory and language: The role of language profile on semantic processing leading to true and false memories. Poster presentation at the Cognitive Neuroscience Society (CNS 2018) annual meeting. Boston, USA.

36. Martin, C., Quiñones, I., & Carreiras, M. (August, 2018). Being in love changes brain activity during speaking. Poster presentation at 10th Anniversary of the Society for the Neurobiology of Language (SNL 2018), Québec, Canada.

37. Morucci, P., Barilari, M., Collignon, O., Crepaldi, D., & Bottini, R. (May, 2018). The concreteness effect is independent of visual experience. Poster presentation at the Workshop on Concepts, Actions, and Objects (CAOS 2018), Rovereto, Italy.

38. Nara, S., Zarraga, A., Bourguignon, M., & Molinaro, N. (June 20-22, 2018). Neural correlates of Predictable and Non-Predictable targets in Visual Predictions. Poster presentation at 1st International Workshop on Predictive Processing (WoPP), Donostia-San Sebastian, Spain.

39. Navarra Barindelli, E., Caffarra, S., Guediche, S., & Martin, C.D. (July, 2018). Cognate effect in noise. Poster presentation at the SEPEX-SEPNECA conference, Madrid, Spain.

40. Ostiz-Blanco, M., Lallier, M., Grau, S., Rello, L., Bigham, J.P., & Carreiras, M. (October 22-24, 2018). Jellys: Towards a Videogame that Trains Rhythm and Visual Attention for Dyslexia. Demo presentation at the Proceedings of the 20th International ACM SIGACCESS conference on Computers & Accessibility - ASSETS '18, Galway, Ireland.

41. Ostiz-Blanco, M., Pina, A., Lizaso, M., Astráin, J.J. & Arrondo, G. (October 22-24, 2018). Using the musical multimedia tool ACMUS with people with severe mental disorders: a pilot study. Demo presentation at the Proceedings of the 20th International ACM SIGACCESS conference on Computers & Accessibility - ASSETS '18, Galway, Ireland.

42. Paz-Alonso, P.M., Gurunandan, K., & Carreiras, M (March, 2018). Convergence of speech-print networks as a marker of language learning. Poster presentation at the Cognitive Neuroscience Society (CNS) annual meeting. Boston, US.

43. Pérez-Navarro, J., Molinaro, N., & Lallier, M. (May, 2018). Speech-brain entrainment in children at risk of Specific Language Impairment. Poster presentation at the Summer Neurolinguistics School, Moscow, Russia.

44. Perez-Serrano, C., Arnaez-Telleria, J., & Paz-Alonso, P.M. (July, 2018). Ventral and dorsal white matter pathways contributions to the testing effect. Poster presentation at the SEPEX-SEPNECA conference, Madrid, Spain.

45. Ristic, B., Mancini, S., & Molinaro, N. (June 20-22, 2018). Predicting syntax: Establishing subject-verb agreement through active maintenance. Poster presentation at 1st International Workshop on Predictive Processing (WoPP), Donostia-San Sebastian, Spain.

46. Sarrett, M., Kapnoula, E.C., & McMurray, B. (2018). Realtime integration of acoustic cues and semantic expectations in speech processing: Evidence from EEG. Poster presentation at the 176th Meeting of the Acoustical Society of America (ASA 2018), Victoria, Canada.

47. Scarinci, D., Carreiras, M., & Mancini, S. (March 15-17, 2018). Processing non-argumental dependencies: tense and aspect in Spanish. Poster presentation at 31st CUNY Conference on Human Sentence Processing, Cuny 2018, Davis, USA.

48. Sheikh, U.A., Carreiras, M., & Soto, D. (June, 2018). Decoding the Meaning of Non-conscious Words with fMRI-based MVPA. Poster presentation at 22nd Annual Meeting of the Association for the Scientific Study of Consciousness, Kraków, Poland.

49. Vespignani, F., Bergamini, E., & Biondo, N. (March, 2018). Verb class is early used during the processing of subject-verb agreement (in Italian). Poster presentation at 31st CUNY Conference on Human Sentence Processing, Cuny 2018, Davis, USA.

Oral Presentations

1. Alemán Bañón, J., & Martin, C.D. (Sept 6-8, 2018). L2 learners predict at the level of the discourse: Evidence from ERP. Oral Presentation at Architectures and Mechanisms for Language Processing, AMLaP 2018, Berlin, Germany.

2. Aguasvivas, J.A., Duñabeitia, J.A., & Carreiras, M. (August, 2018). Bilingual experience effects on statistical learning: Preliminary results. Oral presentation at Statistical Learning Workshop in Quebec City. Quebec, Canada.

3. Antzaka, A., Acha, J., Carreiras, M., Lallier, M. (April, 2018). Does morphological grain size affect the role of the Visual Attention Span in reading? Oral presentation at BDA international conference, Telford, UK.

4. Antzaka, A., Lallier, M., Carreiras, M., Valdois, S. (April, 2018). Can playing Action Video Games modulate attentional components involved in reading? Oral presentation at BDA international conference, Telford, UK.

5. Arnaez-Telleria, J., Carreiras, M., & Paz-Alonso, P.M. (November, 2018). Neurodevelopmental correlates of the testing effect. Oral presentation at the 2018 annual meeting of the Society for Neuroscience (SfN 2018), San Diego, USA.

6. Baart, M., Keetels, M., & Vroomen, J. (November, 2018). Aftereffects of Emotional Affect: Crossmodal Learning, Bias, and Adaptation. Oral presentation at the 59th Annual Meeting of the Psychonomic Society (Psychonomics 2018), New Orleans, USA.

7. Baese-Berk, M.M., & Samuel, A.G. (November 15-18, 2018). The role of timing in perceptual learning of non-native speech sounds. Oral presentation at the 59th Annual Meeting of the Psychonomic Society (Psychonomics 2018), New Orleans, USA.

8. Caballero-Gaudes, C., Moia, S., Bandettini, P., & Gonzalez-Castillo, J. (September 16-20, 2018). Quantitative deconvolution of fMRI data with Multiecho Sparse Paradigm Free Mapping. Oral presentation at MICCAI 2018, Granada, Spain.

9. Caffarra, S., Motamed Haeri, A., Michell, E. & Martin, C.D. (June, 2018). Who makes you laugh? Impact of foreign accent on irony interpretation. Oral presentation at XPRAG, Pavia, Italy.

10. Cespón, J. (February, 2018). Potencial utilidad de la estimulación magnética transcraneal en pacientes con deterioro cognitivo y enfermedad de Alzheimer. Oral presentation at X Jornadas de Neuropsicología CNC, Bilbao, Spain.

11. Costello, B. (February, 2018). Agreement in sign languages: what processing studies add to the debate on spatial grammar. Keynote talk at II Meeting on Morphosyntax of Portuguese Sign Language and other sign languages, Universidade do Porto,O Porto, Portugal.

12. Costello, B., & Carreiras, M. (April, 2018). El procesamiento de la lengua de signos española [Processing of Spanish Sign Language]. Oral presentation as part of the Panel Discussion on Signolingüística at the XXXVI International Conference of the Spanish Association of Applied Linguistics (AESLA), Universidad de Cádiz, Cádiz, Spain.

13. de Bruin, A., & Martin, C. (December, 2018). Choosing your language: How do personal preferences and external primes affect bilingual language choice? Oral presentation at the Conference on Multilingualism, Ghent, Belgium.

14. de Bruin, A., & Della Sala, S. (July, 2018). The bilingual advantage debate: How publication biases affect the literature and systematic reviews. Oral presentation at the 20th International Congress of Linguists, Cape Town, South Africa.

15. de Dios Flores, I. (October, 2018). Interference in Sentence Processing: When Multiple Negations Render Grammatical Sentences Unacceptable. Oral presentation at the AEDEAN Conference, Córdoba, Spain.

16. Frances, C., De Bruin, A., & Duñabeitia, J.A. (July, 2018). Foreign language does not hinder learning emotional concepts. Oral presentation at the Sepex - Sepneca - Aipexperimental joint conference, Madrid, Spain.

17. Frances, C., Sevilla, Y., Planelles Almeida, M., & Duñabeitia, J.A. (September 21-23, 2018). GPS: Latin lover or naggy spouse? Science Slam presentation at CoNSALL Conference, Bangor, UK.

18. Gonzalez-Castillo, J., Caballero-Gaudes, C., & Bandettini, P. (June 16-21, 2018). Quantitative deconvolution of neuronal-related BOLD events with Multi-Echo Sparse Free Paradigm Mapping. Oral presentation at the Annual Meeting of the International Society of Magnetic Resonance in Medicine, ISMRM 2018, Paris, France.

19. Gurunandan, K., Carreiras, M., & Paz-Alonso, P.M. (August, 2018). Neural plasticity of speech and reading networks associated with language learning. Oral presentation at the 2018 meeting of the Society for the Neurobiology of Language (SNL 2018), Québec City, Canada.

20. Hoversten, L.J., & Martin, C.D. (December, 2018). Parafoveal processing in bilingual readers within and across languages. Oral presentation at the 2018 Confreence on Multilingualism (COM), Ghent, Belgium.

21. Hoversten, L.J., & Traxler, M. J. (March, 2018). Zooming in on zooming out: Dynamic tuning of bilingual language control during reading. Oral presentation at 31st CUNY Conference on Human Sentence Processing, Cuny 2018, Davis, USA.

22. Lallier, M., & Ordin, M. (April, 2018). Dichotic listening: a window onto bilingualism reading development. Oral presentation at the International Conference of the British Dyslexia Association, Telford, UK.

23. Morucci, P., Barilari, M., Collignon, O., Crepaldi, D., & Bottini, R. (May, 2018). The concreteness effect is independent of visual experience. Oral presentation at the Workshop on Concepts, Actions, and Objects (CAOS 2018), Rovereto, Italy.

24. Paz-Alonso, P.M. (July, 2018). Visual imagery strengths mnemonic control. Oral presentation at the SEPEX-SEPNECA conference, Madrid, Spain.

25. Rastle, K., Myers, E., Schapiro, A., Batterink, L.J., Armstrong, B.C., & Gareth Gaskell, M. (November 15-18, 2018). Generalization in Language and Memory. Oral presentation at the 59th Annual Meeting of the Psychonomic Society (Psychonomics 2018), New Orleans, USA.

26. Rosenthal, C.R, Mallik, I., Caballero-Gaudes, C., Sereno, M.I., & Soto, D. (June, 2018). Explicit and implicit learning of multiple concurrent higher-order sequences in human V1. Oral presentation at the 22nd Annual Meeting of the Association for the Scientific Study of Consciousness, Kraków, Poland.

27. Samuel, A.G., Choi, W., & Tong, X. (November 15-18, 2018). Better than native: Cantonese-English bilinguals outperform native English speakers on judging English lexical stress. Oral presentation at the 59th Annual Meeting of the Psychonomic Society (Psychonomics 2018), New Orleans, USA.

28. Villameriel, S. (October 26, 2018). La lengua de signos en el cerebro. Oral presentation at "De cañas con el Ateneo", Palencia, Spain.

Invited Talks

1. Aguasvivas, J.A. (March 21, 2018). Medición del léxico a través de plataformas digitales. Invited talk at Primer Encuentro Hispano-Dominicano de Alfabetización en Español, Madrid, Spain.

2. Amoruso, L. (August 26-30, 2018). Contextual effects in perceiving others' actions. Invited talk at the 41st European Conference on Visual Perception (ECVP), Trieste, Italy.

3. Baart, M. (June 13, 2018). Phonetic binding in audiovisual speech. University of Toronto, Toronto, Canada.

4. Biondo, N. (June 8, 2018). Agreement and Tense dissociation: new evidence from adults' sentence processing. Invited talk at workshop Linguistic Structure and Language Processing, 10th year anniversary of the Fondazione Marica De Vincenzi Onlus, Palazzo della Società Dante Alighieri, Roma, Italy.

5. Caballero Gaudes, C. (November 9, 2018). The importance of deconvolution for mapping the brain's time-varying activity with functional MRI: Algorithms and applications. Invited talk at a seminar in TECNUN, San Sebastian, Spain.

6. Caffarra, S. (May 10-13, 2018). The learnability of gender agreement in Spanish-Basque bilinguals and Spanish bimodal bilinguals. Invited talk at the XVIII International Morphology Meeting, Budapest, Hungary.

7. Caffarra, S. (November 24, 2018). Aprendizaje lectoescritor y su impacto en la reorganización cerebral. Invited talk at the 40th Anniversary of Fiapas Conference, Madrid, Spain.

8. Carreiras, M. (January 30, 2018). Brain Laterality and Bilingualism. Invited talk at Max-Planck-Institute, Nijmegen, the Netherlands.

9. Carreiras, M. (Marzo 3, 2018). El cerebro multilingüe. Invited talk at Ibercaja, Zaragoza, Spain.

10. Carreiras, M. (Abril 10, 2018). El cerebro bilingüe. Invited talk at Gobierno de Cantabria, Santander, Spain.

11. Carreiras, M. (Abril 17-18, 2018). El cerebro lector. Invited talk at Ministerio de Educación, Cultura y Deporte, Madrid, Spain.

12. Carreiras, M. (Abril 17-18, 2018). Dos lenguas en un cerebro. Invited talk at Ministerio de Educación, Cultura y Deporte Madrid, Madrid, Spain.

13. Carreiras, M. (June 1, 2018). Plasticidad y procesamiento en el cerebro bilingüe. Invited talk at Universitat Autonoma de Barcelona, Barcelona, Spain.

14. Carreiras, M. (June 21-23, 2018). El cerebro lector. Invited talk at ACIPE & Universidad de La Rioja, Logroño, Spain.

15. Carreiras, M. (June 22-23, 2018). Language representation and control in awake patient bilinguals. Invited talk at ELGGN, Lisbon, Portugal.

16. Carreiras, M. (July, 2018). El cerebro lector. Invited talk at Ayuntamiento de Bétera, Bétera, Spain.

5.C PARTICIPATION IN CONFERENCES

17. Carreiras, M. (July, 2018). The bilingual brain: Plasticity and processing from cradle to grave. Invited talk at Huaqiao University, Xiamen, China.

18. Carreiras, M. (Septiembre 8, 2018). El cerebro lector . Invited talk at Intelexia, Ediciones Logos, Fundación INECO y Haskins Laboratories de Yale University, Buenos Aires, Argentina.

19. Carreiras, M. (Septiembre 28-29, 2018). The bilingual brain: Plasticity and processing from cradle to grave. Invited talk at Saint Petersburg State University, Saint Petersburg, Russia.

20. Carreiras, M. (Octubre, 1-2-16, 2018). Neurociencia, lenguaje y proceso educativo. Invited talk at Fundación Colegio Vizcaya Fundazioa, Bilbao, Spain.

21. Carreiras, M. (Octubre 22,2018). La magia del lenguaje. Invited talk at El Museo de la Ciencia y el Cosmos del Organismo Autónomo de Museos y Centros del Cabildo de Tenerife, Tenerife, Spain.
22. Carreiras, M. (Octubre 28, 2018). Orthographic and lexical effects in visual recognition in Arabic. Invited talk at United Arab Emirates University, Al-Ain, Emiratos Arabes.

23. Correia, J., Carreiras, M., & Uludag, K. (October 2018). Prospects of laminar fMRI in ultra-high-field (7 tesla MRI) to unravel bottom-up and top-down representations of language. Invited talk at Sungkyunkwan University, Seul, South Korea.

24. Costello, B. (May, 2018). Bilingüismo: lengua oral y lengua de signos. Invited talk at III Jornada sobre Audición y Lenguaje "El bilingüismo desde el desarrollo del lenguaje", Universidad de Deusto, San Sebastián, Spain.

25. de Bruin, A. (August, 2018). Language switching and inhibitory control in Spanish-Basque children and teenagers. Invited talk at the Bilingual Education Research Conference, Berlin, Germany.

26. Frances, C. (November, 2018). El impacto de las neurociencias en la investigación y la enseñanza de ELE: Las emociones en la lengua extranjera y su impacto en el aprendizaje. Invited talk at at the IV Congreso Sicele, Rosario, Argentina.

27. Frances, C. (February, 2018). Introduction to OpenSesame Workshop. Invited talk at Bangor University, Wales, UK.

28. Galparsoro, N. (March 1, 2018). Construcción de una bateria de evaluación para TEL. Invited talk at Congreso de la FANPSE, Valencia, Spain.

29. Lallier, M. (January 18, 2018). How does the sensitivity to rhythm shape the reading brain? Keynote speaker in the symposium "It's all about time: Auditory processing, speech perception, and reading", at ExpORL, Dept. Neurosciences, Leuven University, Leuven, Belgium.

30. Lallier, M. (May, 2018) Bilingüismo y Desarrollo del lenguaje Escrito. Keynote speaker at III Jornada sobre Audición y Lenguaje "El bilingüismo desde el desarrollo del lenguaje", Universidad de Deusto, San Sebastiàn, Spain.

31. Lallier, M. (May, 2018). Attention Auditive, Attention Dynamique et Troubles de Apprentissages. Keynote speaker at 6ème Congrès de la SOFTAL "Attention et Apprentissages, Approches Innovantes et Nouvelles Technologies". Université Grenoble-Alpes, Grenoble, France.

32. Martin, C.D. (May, 2018). Prediction in sentence comprehension. Invited talk at Centre for Research on Bilingualism, Stockholm University, Stockholm, Sweden.

33. Martin, C.D. (November 29, 2018). Language comprehension in accented speech. Invited talk at Distinguished Speaker Series, Pennsylvania State University's Center for Language Science, Pennsylvania, USA.

34. Molinaro, N. (March 7, 2018). Delta vs. theta speech entrainment: MEG evidence from typical and atypical language users. Invited talk at IMPRS NeuroCom Lecture Series, Max Planck Institute for Human Cognitive and Brain Sciences, Munich, Germany.

35. Ostiz-Blanco, M. (June, 2018). Abordando la dislexia de un modo indirecto. Invited talk at "Herramientas tecnológicas frente a la dislexia", Instituto de Cultura y Sociedad, Universidad de Navarra, Pamplona, Spain.

36. Paz-Alonso, P.M. (July, 2018). Converging evidence for a functional and structural segregation within the left ventral occipitotemporal cortex in reading. Invited talk at the International Forum of Brain and Language, Huaqiao University, Quanzhou, China.

37. Paz-Alonso, P.M. (December, 2018). Converging evidence for a functional and structural segregation within the left vOTC in reading. Invited talk at the "V Encuentro Vasco-Chileno en Investigación Biomédica, Santiago, Chile.

38. Paz-Alonso, P.M. (December, 2018). Developmental trajectories of human thalamic nuclei and its relation to cognitive development. Invited talk at "Talleres de Trabajo con Estudiantes de Doctorado y Pregrado", Facultad de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile.

39. Paz-Alonso, P.M. (July, 2018). Differential reading and speech functional dynamics for highly contrasting languages. Invited talk at the National Taiwan Normal University, Taipei, Taiwan.

40. Quiñones I. (2018). Las emociones y el cerebro. Nuerociencia y Educación. Invited talk at KRISTAU ESKOLA, Bilbao, Spain.

41. Quiñones I., Duñabeitia J., & Carreiras M. (March 20, 2018). Cambios cerebrales asociados a la alfabetización de adultos. Invited talk at Nebrija University, Madrid, Spain.

42. Soto, D. (2018). Can non-conscious representations support high-level cognition? Invited talk at NeuroSpin, École des Neurosciences, Paris, France.

43. Stoehr, A., Benders, T., van Hell, J., & Fikkert, P. (July 26-27, 2018). What affects bilingual children's speech production? Evidence on the role of perception and accented input on Dutch-German bilingual children's VOTs. Invited talk at Current Issues in Child Bilingual Development, Macquarie University, North Ryde, Australia.

44. Villameriel, S. (April 13, 2018). La investigación en bilingües bimodales. Invited talk at Universidad de Oviedo, Oviedo, Asturias.

2019

Poster Presentations

1. Aguasvivas, J.A., Duñabeitia, J.A., & Carreiras, M. (April, 2019). Does previous linguistic experience facilitate novel language learning? Poster presentation at the Groningen Spring School on Cognitive Modeling, Groningen, The Netherlands.

2. Aguasvivas, J.A., Duñabeitia, J.A., & Carreiras, M. (September, 2019). Does bilingual experience facilitate novel morphology learning? Poster presentation at the AMLAP conference, Moscow, Russia.

3. Alcalá-López, D., & Soto, D. (June, 2019). Brain representations of social knowledge during mental simulation. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

4. Ansorena, X., Hernández, M., Carreiras, M., Quemada, J.I., & Mancini, S. (September 24-26, 2019). Short Term Memory and sentence processing in deep dysphasia. Poster presentation at 20th Science of Aphasia Conference, Rome, Italy.

5. Arnaez-Telleria, J., Mezer, A., & Paz-Alonso, P.M. (June, 2019). Neurodevelopmental changes in qMRI measures in hippocampal and cortical regions. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

6. Arnaez-Telleria, J. & Paz-Alonso, P.M. (March, 2019). Developmental changes and neural correlates of associative, spatial and temporal relational memory. Poster presentation at the Cognitive Neuroscience Society (CNS 2019) annual meeting. San Francisco, USA.

7. Bañón, J.A., & Martin, C.D. (August, 2019). Examining prediction at the level of the discourse: An ERP study. Poster presentation at the Eleventh Annual Meeting of the Society for the Neurobiology of Language (SNL 2019), Helsinki, Finland.

8. Bergouignan, L., Carreiras, M., & Paz-Alonso, P.M. (June, 2019). Our Inner-Speech Language interacts with Our Reality Tag in the Episodic Hippocampal System. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

9. Biondo, N., & Mancini, S. (August, 2019). The grammaticalization of different relations during adult second language (L2) acquisition. Poster presentation at the Eleventh Annual Meeting of the Society for the Neurobiology of Language (SNL 2019), Helsinki, Finland.

10. Biondo, N., & Mancini, S. (September, 2019). Tense-agreement dissociation in adult second language (L2) acquisition. Poster presentation at the Brain, Language & Learning conference, Siena, Italy.

11. Borragan, M. (September, 2019). Changes throughout age in sensitivity to markedness. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

12. Caffarra, S., Haeri, A. M., Michell, E., & Martin, C.D. (March, 2019). When is irony influenced by communicative constraints? ERP evidence supporting interactive models. Poster presentation at 32nd Annual CUNY Conference on Human Sentence Processing (CUNY 2019), Colorado Boulder, USA.

13. Caffarra, S., Gonzalez, A., & Martin, C.D. (March, 2019). Syntactic interlanguage speech benefit: an ERP study. Poster presentation at 32nd Annual CUNY Conference on Human Sentence Processing (CUNY 2019), Colorado Boulder, USA.

14. Clark, C., Guediche, S., & Lallier, M. (October, 2019). Cross-modal effects of sentence context on visual word recognition in adults. Poster presentation at the International Workshop on Reading and Developmental Dyslexia, San Sebastian, Spain.

15. Costello, B., Giezen, M., Stutzman, L., Sampedro, M.A., Villameriel, S., & Carreiras, M. (September, 2019). Effects of familiarity, iconicity and phonological density in the LSE lexicon. Poster presentation at TISLR13 (Theoretical Issues in Sign Language Research), Hamburg, Germany.

16. de-Dios-Flores, I., Mancini, S., Acuña-Fariña, C. & Carreiras, M. (April, 2019). Eye-tracking the use of control information in null subject-antecedent dependencies. Poster presentation at the XIV International Symposium of Psycholinguistics, Tarragona, Spain.

17. Dueme, F., Stoehr, A., & Martin, C.D. (June, 2019). Does the orthography of a new L2 impact L1 production and perception? Poster presentation at the L2 Pronunciation Research Workshop (l2prw2019), Barcelona, Spain.

18. Dumay, N., & Nash, A. (September, 2019). Sleep makes perceptual memories more accessible: Evidence from Reicher-Wheeler. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

19. Frances, C., De Bruin, A., & Duñabeitia, J.A. (July, 2019). The effects of language and emotional context on learning. Poster presentation at SAMBA Conference, Salzburg Austria.

20. Frances, C., De Bruin, A., & Duñabeitia, J.A. (September, 2019). The Influence of Emotional and Foreign Language Context in Learning. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

5.C PARTICIPATION IN CONFERERENCES

21. Frances, C., Martin, C.D., De Bruin, A, & Duñabeitia, J.A. (November, 2019) The effects of contextual factors on learning in a native and a foreign language. Poster presentation at PhDay, Universidad Complutense de Madrid, Madrid, Spain.

22. Ferrer-Gallardo, V., Delgado, M., Navalpotro, I., Moia, S., Carreiras, M., Rodriguez-Oroz, M.C., & Caballero-Gaudes, C. (June, 2019). Impact of mild cognitive impairment in Parkinson's disease in the Functional connectome. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

23. Frances, C., Navarra-Barindelli, E., & Martin, C.D. (September, 2019). Oral Cognates. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

24. Furgoni, A., Stoehr, A., Dueme, F., & Martin, C. (October 2-4, 2019). Orthographic Consistency Effect: Evidence at the phonemic level. Poster presentation at International Workshop on Reading and Developmental Dyslexia, Donostia-San Sebastian, Spain.

25. Geng, S., Amoruso, L., Molinaro, N., & Carreiras, M. (August, 2019). Spatio-temporal dynamics of noun and verb naming in early bilinguals. Poster presentation at the Eleventh Annual Meeting of the Society for the Neurobiology of Language (SNL 2019), Helsinki, Finland.

26. Gisbert-Muñoz, S., Quiñones, I., Amorouso, L., Pomposo, I., Gil-Robles, S., & Carreiras, M. (September, 2019). MULTIMAP: Multilingual visual naming test for the mapping of eloquent areas during awake surgeries. Poster presentation at conference of the European Society for Cognitive Psychology (ESCOP 2019), Tenerife, Spain.

27. Guediche, S., de Bruin, A., Caballero-Gaudes, C., Baart, M., & Samuel. A.G. (August, 2019). Modulation of functional connections from temporal cortex during second language word recognition in noise: does L2 - L1 phonological similarity matter? Poster presentation at the Eleventh Annual Meeting of the Society for the Neurobiology of Language (SNL 2019), Helsinki, Finland.

28. Gurunandan, K., Carreiras, M., & Paz-Alonso, P.M. (March, 2019). Differential neuroplasticity of language systems in adult language acquisition. Poster presentation at the Cognitive Neuroscience Society (CNS 2019) annual meeting. San Francisco, USA.

29. Gurunandan, K., Ibarbia, M., Carreiras, M., & Paz-Alonso, P.M. (March, 2019). Structural changes induced by creativity training. Poster presentation at the Society for Neuroscience of Creativity (SfNC 2019) annual meeting. San Francisco, USA.

30. Gurunandan, K., Ibarbia, M., Carreiras, M., & Paz-Alonso, P.M. (June, 2019). Structural correlates of creativity training in chefs. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

31. Hartzell, J.F., & Paz-Alonso, P.M. (August, 2019). Tip-of-the-Tongue: A window into neural interactions between memory and language systems. Poster presentation at the Eleventh Annual Meeting of the Society for the Neurobiology of Language (SNL 2019), Helsinki, Finland.

32. Hoversten, L.J., & Traxler, M.J. (November, 2019). Asymmetric switch costs accompanied by symmetric suppression of the alternate language during bilingual reading. Poster presentatiton at the Psychonomic Society Meeting, Montreal, Canada.

33. Ibarbia, M., Gurunandan, K., Carreiras, M., & Paz-Alonso, P.M. (March, 2019). Functional contributions to general and specific creative problem solving. Poster presentation at the Society for Neuroscience of Creativity (SfNC 2019) annual meeting. San Francisco, USA.

34. Ibarbia, M., & Paz-Alonso, P.M. (March, 2019). Magnocellular and parvocellular contributions to reading. Poster presentation at the Cognitive Neuroscience Society (CNS 2019) annual meeting. San Francisco, USA.

35. Ibarbia, M., & Paz-Alonso, P.M. (June, 2019). Magnocellular and parvocellular contributions to visual object and word recognition. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

36. Kalashnikova, M., Goswami, U., & Burnham, D. (September, 2019). Infant directed speech to infants at family risk for dyslexia. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

37. Kalashnikova, M., Goswami, U., & Burnham, D. (June, 2019). Infant-directed speech and parent-directed signals in interactions with infants at family risk for dyslexia. Poster presentation at the Workshop on Infant Language Development (WILD), Potsdam, Germany.

38. Kapnoula, E.C., & Samuel, G.A. (April, 2019). Disentangling the effects of production and speaker variability on word learning. Poster presentation at the XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

39. Kapnoula, E.C., & Samuel, A.G. (November, 2019). Does saying a new word out loud help to learn it better? Poster presentation at the 60th Annual Meeting of the Psychonomic Society, Montreal, Canada.

40. Kapnoula, E.C., & Samuel, A.G. (September, 2019). Does saying a new word out loud help to learn it better? Disentangling the effects of production and speaker variability on word learning. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

41. Kartushina, N., & Martin, C. (August, 2019). Dynamic changes in bilingual production as a function of L3-English use: Insights from a longitudinal study in Spanish-Basque Erasmus students. Poster presentation at New Sounds 2019, Tokyo, Japan.

42. Lerma-Usabiaga, G., Mukherjee, P., Ren, Z., Perry, M., & Wandell, B. (June, 2019). Replication and generalization in applied neuroimaging. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

43. Liu, M., Wang, X., Zhang, X., Zhang, R., Paz-Alonso, P.M., & Yang, J. (August 20-22, 2019). Semantic Integration During Language Comprehension in Natural Contexts. Poster presentation at the Eleventh Annual Meeting of the Society for the Neurobiology of Language (SNL 2019), Helsinki, Finland.

44. Ludowicy, P., Arnaez-Telleria, J., Gurunandan, K., Czernochowski, D., Lachmann, T., & Paz-Alonso, P.M. (June, 2019). Neural modulation of the Testing Effect via test-potentiated encoding with feedback. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

45. Ludowicy, P., Paz-Alonso, P.M., Lachmann, T., & Czernochowski, D. (September, 2019). Performance feedback enhances test potentiated encoding: An event-related potential study on the testing effect. Poster presentation at the 21st ESCoP conference, Tenerife, Spain.

46. Martin, C.D., Goddard, K., Koutsogiannaki, M., & Kartushina, N. (August, 2019). Optimization in non-native speech sound production. Poster presentation at the Eleventh Annual Meeting of the Society for the Neurobiology of Language (SNL 2019), Helsinki, Finland.

47. Martin, C.D., & Nozari, N. (April, 2019). Language control in bilingual word production: Insights from error rate and error type in sentence production. Poster presentation at the XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

48. Martorell, J., Alhama, R.G., Molinaro, N., & Mancini, S. (April, 2019). Predictive generation of syntax during sentence reading. Poster presentation at the XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

49. Martorell, J., Alhama, R.G., Molinaro, N., & Mancini, S. (June, 2019). Preactivating syntactic information during reading. Poster presentation at Psycholinguistics in Iceland – Parsing and Prediction conference, Reykjavík, Iceland.

50. Mei, N., Sheikh, U., Santana, R., & Soto,D. (September, 2019). How the brain encodes meaning: Comparing word embedding and computer vision models to predict fMRI data during visual word recognition. Poster presentation at 2019 Conference on Cognitive Computational Neuroscience, Berlin, Germany.

51. Mei, N., & Soto,D. (September, 2019). Predicting human prospective beliefs and decisions to engage using multivariate classification analyses of behavioural data. Poster presentation at 2019 Conference on Cognitive Computational Neuroscience, Berlin, Germany.

52. Moia, S., Termenon, M., Uruñuela, E., Bright, M. G., & Caballero-Gaudes, C. (September, 2019). Comparison of ICA-based denoising approaches in breath-holding task with ME-fMRI data. Poster presentation at the ICP Network Symposium: Physiological and Functional MRI of the Brain: Emerging Techniques and Clinical Applications, Baltimore, USA.

53. Morucci, P., Giannelli, F., & Molinaro, N. (March, 2019). Native language affects visual processing by activating categorical template of objects via the modulation of alpha oscillations. Poster presentation at the Cognitive Neuroscience Society (CNS 2019) annual meeting. San Francisco, USA.

54. Morucci, P., Martin, C.D., & Molinaro, N. (September 2019). Language experience affects prediction during auditory rhythm perception. Poster presentation at the predictive brain conference, Marseille, France.

55. Muller, H., de-Dios-Flores, I., & Phillips, C. (March, 2019). Not (just) any licensors cause negative polarity illusions. Poster presentation at 32nd Annual CUNY Conference on Human Sentence Processing (CUNY 2019), Colorado Boulder, USA.

56. Navarra-Barindelli, E., Guediche, S., Caffarra, S., & Martin, C.D. (September, 2019). The Cognate Effect in Noise. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

57. Ordin, M., Polyanskaya, L., Gomez, D., & Samuel, A.G. (April 24-26, 2019). Universality and linguistic experience in the perception of speech rhythm, and its relevance for speech evolution. Poster presentation at the 14th European Human Behaviour and Evolution Association Conference, Toulouse, France.

58. Ordin, M., Polyanskaya, L., & Soto, D. (September, 2019). Neural bases of statistical learning in artificial language. Poster presentation at the AMLAP conference, Moscow, Russia.

59. Pérez-Navarro, J., Molinaro, N., & Lallier, M. (September, 2019). Is the amount of exposure a good predictor of language development? Evidence from a bilingual population. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

60. Pérez-Navarro, J., Molinaro, N., & Lallier, M. (September, 2019). Exploring the relationship between speech-brain entrainment and language development in children at risk of developmental language disorder. Poster presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

61. Polyanskaya, L., Ordin, M., Gomez,D., & Samuel, A.G. (September, 2019). Universality and linguistic experience in the perception of speech rhythm. Poster presentation at the AMLAP conference, Moscow, Russia.

62. PourHashemi, F., Baart, M., & Vroomen, J. (December 19-21, 2019). Auditory learning of noise vocoded speech by lip-read information: Does reading skill matter? Poster presentation at the 17th Winterconference on Brain and Cognition (NVP), Egmond aan Zee, the Netherlands.

63. Quiñones, I., Molinaro, N., Caballero-Gaudes, C., Mancini, S., Barber, H., & Carreiras, M. (June, 2019). Integrating form and meaning in the left angular gyrus. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

64. Sheikh, U. A., Carreiras, M., & Soto, D. (June, 2019). Brain Mechanisms Underlying Generalization of Concepts Across Languages. Poster presentation at Human Brain Mapping (2019 OHBM), Rome, Italy.

65. Timofeeva, P., Amoruso, L., & Carreiras, M. (September, 2019). Investigating the time course of bilingual and monolingual linguistic control mechanisms: An MEG study. Poster presentation at the AMLAP conference, Moscow, Russia.

66. Timofeeva, P., Amoruso, L., & Carreiras, M. (August, 2019) Spatiotemporal signatures of linguistic control mechanisms in bilingual and monolingual contexts. Poster presentation at the Eleventh Annual Meeting of the Society for the Neurobiology of Language (SNL 2019), Helsinki, Finland.

67. Uruñuela-Tremiño, E., Moia, S., Zheng, C., González-Castillo, J., & Caballero-Gaudes, C. (May 15, 2019). Deconvolution of multi-echo functional MRI data with Multivariate Multi-Echo Sparse Paradigm Free Mapping. Poster presentation at the Annual Meeting of International Society Magnetic Resonance in Medicine, (ISMRM 2019), Montreal, Canada.

68. Williams, L., Kapnoula, E., & de Bruin, A. (March, 2019). Bilingual language mode is flexible: Evidence from a lexical decision task. Poster presentation at the 3rd Biennial International Convention of Psychological Science, Paris, France.

Oral Presentations

1. Aguasvivas, J.A., Duñabeitia, J.A., & Carreiras, M. (September, 2019). "Txakurra" is "perro" but also "dog": How input variability impacts bilingual language learning in different contexts. Oral presentation at the 6th Barcelona Summer School on Bilingualism and Multilingualism, Barcelona, Spain.

2. Amoruso, L., Molinaro, N., Geng, S., Quiñones, I., Timofeeva, P., Gisbert-Muñoz, S., Gil-Robles, S., Pomposo, I., & Carreiras, M. (June, 2019). Noun-verb dissociation in the brain: MEG evidence from healthy participants and patients with slow-growing brain tumors. Oral presentation at European Low Grade Glioma Network Meeting (ELGGN 2019), London, UK.

3. Amoruso, L., Molinaro, N., Geng, S., Quiñones, I., Timofeeva, P., Gisbert-Muñoz, S., Gil-Robles, S., Pomposo, I., & Carreiras, M. (September, 2019). An oscillatory model of noun-verb dissociations: MEG evidence from healthy participants and brain tumor patients. Oral presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

4. Baart, M., López Zunini, R.A., Samuel, A. G., & Armstrong, B.C. (December 19-21, 2019). Lexico-semantic access and audiovisual integration in the aging brain: Insights from single trial Event-Related Potentials. Oral presentation at the 17th Winterconference on Brain and Cognition (NVP), Egmond aan Zee, the Netherlands.

5. Biondo, N., Bergamini, E., & Vespignani, F. (June, 2019). An ERP study on the effect of distance during the processing of temporal concord violations. Oral presentation at Experimental Psycholinguistics Conference. Palma de Mallorca, Spain.

6. Borragan, M. (August, 2019). Morpho-functional changes in the glottis after breathing in air with humidity. Oral presentation at Congress of the The Pan-European Voice Conference (Pevoc), Copenhagen, Denmark.

7. Cholin, J., Abad Bruzzo, K.F., Jorschick, A.B., & Carreiras, M. (September 2019). Proficiency shapes the representation and access of syllabic motor programs in bilingual speakers: Syllable-frequency effects in early high-proficient Spanish-Basque bilinguals and late low-proficient Spanish-German bilinguals. Oral presentation at 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

8. de Bruin, A., & Martin, C. (April, 2019). Bilingual language choice is affected by external primes and individual language preferences. Oral presentation at the XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

9. Dumay, N., & Nash, A. (November, 2019). Sleep makes perceptual memories more accessible: Evidence from Reicher-Wheeler. Oral presentation at the 60th Annual Meeting of the Psychonomic Society, Montreal, Canada.

10. Dumay, N., Nash, A., & Starr, L. (September, 2019). Setting the alarm while you sleep. Oral presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

11. Frances, C., De Bruin, A., & Duñabeitia, J.A. (April, 2019). The Influence of Emotional and Foreign Language Context in Learning. Oral presentation at the XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

12. Frances, C., Martin, C., & Duñabeitia, J.A. (September, 2019). The effects of contextual diversity on foreign and native language vocabulary learning. Oral presentation at the 6th Barcelona Summer School on Bilingualism and Multilingualism, Barcelona, Spain.

13. Frances, C., Thierry, G., & Duñabeitia, J.A. (September, 2019). Investigating strategic language choice in fluent bilinguals during a deception inducing game. Oral presentation at the 6th Barcelona Summer School on Bilingualism and Multilingualism, Barcelona, Spain.

14. Furgoni, A., Stoehr, A., Dueme, F., & Martin, C.D. (November 28-29, 2019). The Orthographic Consistency Effect in language perception: Evidence at the phonemic level. Oral presentation at 1st International Conference for Young Researchers in Cognitive Linguistics (YRCL1), Madrid, Spain.

15. Guediche, S., & Caffarra, S. (September, 2019). Auditory comprehension under adverse listening conditions. Symposium at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

16. Gisbert-Muñoz, S., Quiñones, I., Amoruso, L., Pomposo, I., Gil-Robles, S., & Carreiras, M. (June, 2019). MULTIMAP: Multilingual visual naming test for the mapping of eloquent areas during awake surgeries. Oral presentation at European Low Grade Glioma Network Meeting (ELGGN 2019), London, UK.

17. Heinzová, P., Carreiras, M. & Mancini, S. (May, 2019). Argument structure processing in bilingual speakers. Oral presentation at Psycholinguistics in Flanders workshop 2019, Antverps, Belgium.

18. Kalashnikova, M. (March, 2019). The acquisition of word learning strategies by monolingual and bilingual toddlers. Oral presentation at the Biannual Meeting of the Society for Research on Child Development (SRCD), Baltimore, USA.

19. Kalashnikova, M. (April, 2019). Acoustic qualities of bilingual infant directed speech. Oral presentation at the XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

20. Kalashnikova, M. (June, 2019). Exaggerated prosody in infant directed speech facilitates infants' predictions of conversational turns. Oral presentation at the Workshop on Infant Language Development (WILD), Potsdam, Germany.

21. Kalashnikova, M. & Carreiras, M. (September, 2019). Early speech perception development in Spanish-Basque bilingual infants. Oral presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

22. Kapnoula, E.C., & McMurray, B. (2019). What can continuous responses tell us about phoneme categorization? Oral presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

23. Klimovich-Gray, A. (April, 2019). Domain-general and domain-specific processes in spoken word recognition. Oral presentation at the XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

24. Mancini, S., Paz-Alonso, P., & Carreiras, M. (September, 2019). The cortical representation of left and right branching: evidence from Spanish and Basque. Oral presentation at Brain, Language & Learning Conference, Siena, Italy.

25. Martin, C.D. (April, 2019). Prediction in bilingualism: Lexical anticipation in L2 comprehension and in accented L1 comprehension. Oral presentation in Memoriam of Albert Costa. The XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

26. Martin, C.D., & Scharff, C. (September 28, 2019). Communication Systems Across Species: How Research on Animals Inspires Research on Humans. Symposium at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

27. Martin, C.D., Quinones, I., & Carreiras, M. (September, 2019). Humans speak as birds sing: Socially-mediated brain activity in language production. Oral presentation at the 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

28. Ordin, M., Polyanskaya, L., & Soto, D. (September, 2019). Metacognitive processing in statistical learning is modulated by bilingualism. Oral presentation at the AMLAP conference, Moscow, Russia.

29. Polyanskaya, L., Samuel, A., & Ordin, M. (April 24-26, 2019). Isochrony and meter convergence in speech as coalition signals. Oral presentation at the 14th European Human Behaviour and Evolution Association Conference, Toulouse, France.

30. Quiñones, I., Amoruso, L., Gisbert-Muñoz, S., Pomposo, I., Gil-Robles, S., & Carreiras, M. (June, 2019). Neural capacity to negotiate L1 and L2 language information after the removal of a language hub. Oral presentation at European Low Grade Glioma Network Meeting (ELGGN 2019), London, UK.

31. Quiñones, I. Molinaro, N. Caballero, C., Mancini, S, Hernández-Cabrera, J.A., Barber, H.A., & Carreiras, M. (September, 2019). Integrating form and meaning in the left parietal cortex. Oral presentation at 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

32. Ristic, B., Mancini, S., Molinaro, N., & Staub, A. (June, 2019). Maintain to pre-activate: Is subject-verb dependency proactive? Oral presentation at Psycholinguistics in Iceland – Parsing and Prediction conference, Reykjavík, Iceland.

33. Ristic, B., Mancini, S., Molinaro, N., & Staub, A. (April, 2019). Maintaining long-distance subject-verb dependency in sentence comprehension. Oral presentation at The XIV International Symposium of Psycholinguistics (ISP 2019). Tarragona, Spain.

34. Rivolta, C., Costello, B., & Carreiras, M. (September, 2019). Más allá del espacio: explorando la dimensión del tiempo en LSE. Oral presentation at the Congreso CNLSE 2019, Madrid, Spain.

35. Samuel, A.G. (November 17, 2019). Linguists are brilliant, but psycholinguists should be wary of shiny linguistic units. Oral presentation at the 60th Annual Meeting of the Psychonomic Society, Montreal, Canada.

36. Samuel, A.G., Choi, W., & Tong, X. (January 3-5, 2019). Better than native: Cantonese-English bilinguals outperform native English speakers on judging English lexical stress. Oral presentation at Auditory Cognitive Neuroscience Society, Florida, USA.

37. Scarinci, D., Carreiras, M., & Mancini, S. (April, 2019). A matter of time: parser sensitivity to time-related grammatical categories in Spanish. Oral presentation at the at the XIV International Symposium of Psycholinguistics (ISP 2019), Tarragona, Spain.

38. Uruñuela-Tremiño, E., Moia, S., Zheng, C., González-Castillo, J., & Caballero-Gaudes, C. (May 15, 2019). Deconvolution of multi-echo functional MRI data with Multivariate Multi-Echo Sparse Paradigm Free Mapping. Oral presentation at the Annual Meeting of International Society Magnetic Resonance in Medicine, (ISMRM 2019), Montreal, Canada.

Invited Talks

1. Biondo, N. (June, 2019). Are all concord relations grammaticalized in the same way during (adult) second language (L2) acquisition? Invited talk at the University of Trento, Rovereto, Italy.

2. Caballero-Gaudes, C. (May 11, 2019). Preprocessing. Invited talk at Educational Course "fMRI: Back to Basics" at Annual Meeting of International Society Magnetic Resonance in Medicine, ISMRM 2019, Montreal, Canada.

3. Caffarra, S. (February, 2019). The impact of speaker and addressee identity on sentence analysis. Invited talk at the "Giornate di Studi Scientifici sul Liguaggio", Rovereto, Italy.

4. Carreiras, M. (March, 2019). The Literate Brain. Invited talk at the Mind-Brain College of Universidade de Lisboa, Lisboa, Portugal.

5. Carreiras, M. (April, 2019). Neurociencia, lenguaje y proceso educativo. Invited talk at the Cátedra TECNOEDU de la Universidad de La Laguna, Tenerife, Spain.

6. Carreiras, M. (April, 2019). Neurociencia, lenguaje y proceso educativo. Invited talk at the Cátedra TECNOEDU de la Universidad de La Laguna, Las Palmas, Spain.

7. Carreiras, M. (April, 2019). The Literate Brain. Invited talk at XIV International Symposium of Psycholinguistics (ISP 2019). Tarragona, Spain.

8. Carreiras, M. (May, 2019). The Literate Brain. Invited talk at a Seminary. Beijing, China.

9. Carreiras, M. (May, 2019). Mechanisms of agreement. Invited talk at a Seminary. Beijing, China.

10. Carreiras, M. (May, 2019). The bilingual brain: Plasticity and processing from cradle to grave. Invited talk at a Seminary. Beijing, China.

11. Carreiras, M. (July, 2019). Neurociencia, lenguaje y proceso educativo. Invited talk at Jornadas 2019: ¿Estamos a la altura de los niños con diferencias de aprendizaje?. Fundación Ricardo Fisas Natura Bissé. Sant Cugat, Barcelona , Spain.

12. Carreiras,M. (September, 2019). Two Languages in one Brain. Invited talk at 21st ESCoP conference (ESCoP 2019), Tenerife, Spain.

13. Carreiras, M. (October, 2019). Las ilusiones del lenguaje. Invited talk at Semana de la Ciencia UPV/ EHU. Bilbao, Spain.

14. Cespón, J. (March, 2019). Neuroplasticity in elderly during physiological and pathological ageing. Invited talk at II JORNADA SEMEG ACTUALIZACIÓN EN EL MANEJO DE LAS PERSONAS MAYORES QUE SUFREN CAÍDAS. ¿SON LAS CAÍDAS EL PRIMER SIGNO DE FALLO COGNITIVO? SEMEG Sociedad Española de Medicina Geriátrica, Madrid, Spain.

15. de Bruin, A. (June, 2019). How do bilinguals switch between their languages? Invited talk at the Universidad Nebrija, Madrid, Spain.

16. Frances, C. (January 29-30, 2019). La lengua extranjera no dificulta el aprendizaje de conceptos emocionales. Invited talk at Universidad de Nebrija, Madrid, Spain.

17. Kalashnikova, M. (May, 2019). Infant-directed speech facilitates neural encoding of speech during infants' first year of life. Invited talk in the Special session "Perception of speech directed toward infants and children" at the Acoustical Society of America 177th Meeting, Louisville, KY, USA.

18. Molinaro, N. (March 28, 2019). Predicting language in a multilingual society. Invited talk at Rutgers University, New Jersey, USA.

19. Paz-Alonso, P.M. (March, 2019). Converging evidence underlying the role of the thalamus in typical and atypical reading. Invited talk at the CIMCYC External Speakers series, University of Granada, Granada, Spain.

20. Paz-Alonso, P.M. (May, 2019). Reading within and beyond the classical reading network: Contributions of the ventral occipitotemporal cortex and thalamic nuclei to reading processes. Invited talk at the Achucarro Basque Center for Neuroscience External Speakers series. Leioa, Spain.

21. Polyanskaya, L. (April 11-13, 2019). Error monitoring and error detection as possible mechanisms underlying metacognition. Invited talk at German-Spanish Interdisciplinary Workshop at Universidad Complutense de Madrid (UCM) and the German Embassy, Madrid, Spain.

22. Richter, C.G. (January, 2019). Spectral estimation of neural and behavioural time series data. Invited talk at the Hebrew University of Jerusalem, Jerusalem, Israel.

23. Soto. D. (February 1, 2019). A novel framework for understanding unconscious information processing. Invited talk at Institute of Neuroscience & Psychology, University of Glasgow, Glasgow, UK.

24. Villameriel, S. (April 12, 2019). La investigación en bilingües en lengua oral y lengua de signos. Invited talk at Universidad de Oviedo, Oviedo, Spain.

25. Villameriel, S. (May 28, 2019). Las lenguas orales y signadas en el cerebro. Invited talk at Escuela Universitaria de Enfermería, Palencia, Spain.

26. Villameriel, S. (June 28, 2019). La investigación en oyentes bilingües en LSE y castellano, ¿cómo procesamos las lenguas? Invited talk at Centro de Intérpretes de LS y Guías-Intérpretes de Castilla y León, Valladolid, Spain.

2020

Poster Presentations

1. Aguasvivas, J.A., Duñabeitia, J.A., & Carreiras, M. (2020). Does bilingual experience facilitate novel vocabulary learning? The role of orthographic similarity. Poster presentation at the AMLaP-Architectures and Mechanisms for Language Processing 2020. Potsdam, Germany, Virtual Conference.

2. Alcalá-López, D., & Soto, D. (May, 2020). Decoding social knowledge in the human brain. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

3. Alcalá, D., Ayyagari, A., Bright, M.G., Caballero-Gaudes, C., Ferrer Gallardo, V., Hayashi, S., Markello, R., Moia, S., Stickland, R., Uruñuela, E., & Zvolanek, K. (June, 2020). Physiopy/phys2bids: BIDS formatting of physiological recordings. Poster presentation at the 2020 meeting of the Organisation of Human Brain Mapping (2020 OHBM), Montreal, Québec, Canada.

4. Aleman Bañon, J., & Martin, C.D. (September, 2020). Cross-linguistic differences can obscure L2 learners' ability to generate predictions: Evidence from ERP. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

5. Ansorena, X., Carreiras, M., & Mancini, S. (October, 2020). Lexical, morphological and syntactic abilities at the discourse level: comparing elicitation methods. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

6. Bergouignan, L., Carreiras, M., & Paz-Alonso, P.M. (May, 2020). Cumulating negative experiences induces structural changes in the left hippocampal dentate gyrus-CA3 and self-related cortical areas. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

7. Blanco, B., Molnar, M., Arrieta, I., Caballero-Gaudes, C., & Carreiras, M. (October, 2020). Hemodynamic Correlates of Speech Processing in Monolingual and Bilingual Infants. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

8. Cheimariou, S., & Kapnoula, E.C. (March, 2020). Differential effects of print exposure on subphonemic sensitivity and lexical competition during spoken word recognition: An individual differences approach. Poster presentation at the 33st Annual CUNY Conference on Human Sentence Processing, Amherst, Massachusetts, USA.

9. Costello, B., Villameriel, S., Giezen, M., & Carreiras, M. (October, 2020). Silent words and invisible signs: cross-language activation in bimodal bilinguals. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

10. de Bruin, A., Hoversten, L.J., Martin, C.D. (June 2020). Why does a trilingual's second language experience more interference from a third than first language? Examining cross-language intrusions and inhibition during trilingual production. Conference on Multilingualism (COM), Virtual Conference.

11. de Dios-Flores, I., Acuña-Fariña, C., Mancini, S., & Carreiras, M. (September, 2020). Processing lexically-based dependencies: an eye-tracking study on verbal control. Poster presentation at AMLaP-Architectures and Mechanisms for Language Processing. Potsdam, Germany. Online conference: https://amlap2020.github.io/

12. Frances, C., Navarra-Barindelli, E., & Martin, C. (October, 2020). Effect of speaker accent on auditory cognate processing by L2 learners of English. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

13. Frances, C., Navarra-Barindelli, E., Pinet, S., & Martin, C. (October, 2020). The effects of accent and likelihood on spellings of unknown words for L2 speakers of English. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

14. Frances, C., & Duñabeitia, J.A. (May, 2020). The effects of contextual diversity on reading measures in foreign and native language vocabulary learning. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

15. Ferrer-Gallardo, V., Delgado, M., Navalpotro, I., Moia, S., Carreiras, M., Paz-Alonso, P.M., Rodriguez-Oroz, M.C., & Caballero-Gaudes, C. (May, 2020). Characteristic Traits of Mild cognitive impairment in Parkinson's disease Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

16. Ferrer-Gallardo, V., Delgado, M., Navalpotro, I., Moia, S., Carreiras, M., Rodriguez-Oroz, M.C., & Caballero-Gaudes, C. (June, 2020). Characteristic functional Traits of Mild cognitive impairment in Parkinson's disease. Poster presentation at Human Brain Mapping (2020 OHBM), Montreal, Canada.

17. Furgoni, A., Stoehr, A., & Martin, C.D. (May, 2020). Speech production also involves orthographic representations: Evidence from Spanish adults and children. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

18. Furgoni, A., Stoehr, A., & Martin, C.D. (September, 2020). Early readers make use of orthographic representations in speech perception and production. Poster presentation at AMLaP-Architectures and Mechanisms for Language Processing. Potsdam, Germany. Online conference: https://amlap2020.github.io/

19. Garcia, M., Aguasvivas, J., Gisbert, S., Gil-Robles, S., Pomposo, I., Carreiras, M., & Quiñones, I. (October, 2020). Functional and structural biomarkers of cognitive outcomes after brain tumor resection. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

20. Garcia, M., Aguasvivas, J., Gisbert,S., Gil-Robles, S., Pomposo, I., Carreiras, M., & Quiñones, I. (May, 2020). Functional and structural biomarkers of cognitive outcomes after brain tumor resection. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

21. Gastaldon, S., Lizarazu, M., Peressotti, F., & Molinaro, N. (June, 2020). Reduced speech–brain entrainment in adult stutterers when listening for speaking. Poster presentation at the IMPRS Conference 2020: Interdisciplinary Approaches in the Language Sciences, Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands. [virtual conference due to COVID-10 pandemic]

22. Geng, S., Molinaro, N., Carreiras, M., & Amoruso, L. (May, 2020). Spatio-temporal dynamics of noun and verb naming in early bilinguals. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

23. Gisbert, S., Quiñones, I., Amorouso, L., Timofeeva, P., Geng, S., Gil-Robles, S., Pomposo, I., & Carreiras, M. (May, 2020). MULTIMAP: Multilingual visual naming test for the mapping of eloquent areas during awake surgeries. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

24. Gurunandan, K., Carreiras, M., & Paz-Alonso, P.M. (October, 2020). Functional specialisation and plasticity of language systems: converging evidence from language learning experiments. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

25. Heinzova, P., Mancini, S., & Carreiras, M. (October, 2020). Processing different levels of argument structure complexity: A behavioral study in balanced Basque-Spanish bilinguals . Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

26. Hoversten, L.J., & Martin, C.D. (March, 2020). The time course of bilingual lexico-semantic access within and across languages: Evidence from the boundary paradigm during reading. Poster presentation at the CUNY Human Sentence Processing Conference, Amherst, Massachusetts, USA.

27. Hoversten, L.J., & Martin, C.D. (May, 2020). Interplay between task demands and language mode in bilingual word recognition: Evidence from ERPs. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

28. Ibarbia, M., Gurunandan, K., Carreiras, M., & Paz-Alonso, P.M. (October, 2020). Contribution of semantic memory and fluid reasoning to creativity problem solving in Chefs. Poster presentation at the Society for the Neuroscience of Creativity Annual Meeting, virtual conference.

29. Ibarbia, M., & Paz-Alonso, P.M. (May, 2020). Role of magnocellular and parvocellular visual pathways in object and word recognition. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

30. Ibarbia, M., & Paz-Alonso P.M. (October, 2020). Developmental trajectories of magnocellular and parvocellular pathways and their contribution to reading. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

31. Jevtovi , M., Stoehr, A., Antzaka, A., & Martin, C.D. (May, 2020). The effects of orthographic consistency at different levels of speech processing in Spanish beginning readers. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

32. Kalashnikova, M. (July, 2020). Effects of bilingualism on the encoding and discrimination of native and non-native speech contrasts. Poster presentation at the International Congress on Infant Studies, virtual conference.

33. Kalashnikova, M., Pejovic, J., & Carreiras, M. (July, 2020). Early attentional control abilities in monolingual and bilingual infants. Poster presentation at the International Congress on Infant Studies, virtual conference.

34. Kim, D., Samuel, A.G., Kapnoula, E.C., Nash, A., & Dumay, N. (November, 2020). Reconciling Subphonemic Mismatch Effects and Other Psycholinguistic Tests of Lexical Engagement. Poster presentation at the 61st Annual Meeting of the Psychonomic Society, Virtual Meeting.

35. Klimovich-Gray, A., & Molinaro, N. (October, 2020). Cortical language processing flexibly adapts to perceptual and contextual properties of speech. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

36. Koutsogiannaki, M., Simantiraki, O., Cooke, M., & Lallier, M. (January, 2020). Listening effort of natural speaking styles. Poster presentation at Speech In noise workshop, Toulouse, France.

37. Lerma-Usabiaga, G., Benson, N., Winawer, J., & Wandell, B. (May, 2020). Computational generalization of neuroimaging software: the case of population receptive fields. Poster presentation at 20th Annual Meeting of the Vision Sciences Society (VSS), St Pete Beach, Florida, USA.

38. Lerma-Usabiaga, G., Benson, N., Winawer, J., & Wandell, B. (May, 2020). A validation framework for neuroimaging software: the case of population receptive fields. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

39. Martorell, J., Mancini, S., Molinaro, N., & Carreiras, M. (October, 2020). The role of lexical information in oscillatory tracking of syntactic structure. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

40. Martorell, J., Mancini, S., Molinaro, N., & Carreiras, M. (September, 2020). Oscillatory tracking of syntactic structure across languages. Poster presentation at the AMLaP-Architectures and Mechanisms for Language Processing 2020. Postdam, Germany, virtual conference.

41. Moia, S., Ferrer Gallardo, V., Stickland, R., Uruñuela, E., Termenon, M., Caballero-Gaudes, C., & Bright, M.G. (June, 2020). Multi-session CVR variability within functional networks. Poster presentation at the 2020 meeting of the Organisation of Human Brain Mapping (2020 OHBM), Montreal, Québec, Canada.

42. Moia, S., Termenon, M., Uruñuela, E., Stickland, R., Bright, M.G., & Caballero-Gaudes, C. (June, 2020). ICA-based denoising strategies in highly motion correlated tasks with Multi Echo BOLD fMRI. Poster presentation at the 2020 meeting of the Organisation of Human Brain Mapping (2020 OHBM), Montreal, Québec, Canada.

43. Moia, S., Termenon, M., Uruñuela, E., Stickland, R.C., Bright, M.G., & Caballero-Gaudes, C. (April, 2020). Improving breath-hold cerebrovascular reactivity mapping with multi-echo BOLD fMRI. Digital poster presentation at ISMRM 2020, Sydney, Australia.

44. Moia, S., Stickland, R.C., Termenon, M., Uruñuela., E., Caballero-Gaudes, C., & Bright, M.G. (April, 2020). Assessment of longitudinal cerebrovascular reactivity measurements based on breath-hold and resting state BOLD multi-echo fMRI. Digital poster presentation at ISMRM 2020, Sydney, Australia.

45. Moia, S., Termenon, M., Uruñuela, E., Stickland, R.C., Bright, M.G., Caballero-Gaudes, C. (September, 2020). Evaluating multi-echo based denoising strategies for breath-hold induced cerebrovascular reactivity mapping. Poster presentation at The European Society for Magnetic Resonance in Medicine and Biology annual meeting (ESMRMB 2020), Virtual Conference.

46. Molinaro, N., Lizarazu, M., Baldin, V., Pérez-Navarro, J., & Ríos-López, P. (May, 2020). Contextual information modulates speech-aligned neural tracking. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

47. Ordin, M., Polyanskaya, L., Gomez, D., & Samuel, A. (April, 2020). Linguistic experience and universal design of the auditory system in speech rhythm perception: implications for speech evolution. Poster presentation at EvoLang XIII conference, Brussels, Belgium.

48. Pérez-Navarro, J.J., Lallier, M. (June, 2020). Amount of exposure and phonological abilities as predictors of general language development: Evidence from a bilingual population. Poster Presentation at 7th Annual Summer Neurolinguistics School, Online Conference.

49. Pinet, S., Alario, F.-X., Longcamp, M., Schön, D., & King, J-R. (October, 2020). Decoding Typing from Electro-Encephalography Reveals how the Human Brain Simultaneously Represents Successive Keystrokes. Poster presentation at LiveMEEG 2020, virtual conference.

50. Pinet, S., Martin, C., & Paz-Alonso, P.M. (October, 2020). A systematic investigation of oral and written language production in fMRI. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

51. Pinet, S., & Nozari, N. (October, 2020). Timeline of monitoring during semantic and phonological interference in word production. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

52. Pinet, S., & Nozari, N. (July, 2020). Using signal detection theory to investigate the role of visual information in performance monitoring in typing. Poster Presentation at the 2020 meeting of Cognitive Science Society (CogSci 2020), virtual conference.

53. Quiñones I., Molinaro N., Caballero-Gaudes C., Mancini S., Hernandez-Cabrera J.A., Barber H., & Carreiras M. (May, 2020). Linguistic input drives brain network configuration during language comprehension. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

54. Ray, D., & Das, M. (October, 2020). Investigating Intero- and Exteroceptive predictive Processes in Major Depressive disorder. Interactive talk at Neuromatch conference 3.0, virtual conference.

55. Rivolta C.L., Costello B., & Carreiras, M. (October, 2020). Temporal processing of a signed language: effect of modality and language status. Poster presentation at the Society for the Neurobiology of Language Annual 12th Meeting (SNL 2020), virtual conference.

56. Rivolta, C., Costello, B., & Carreiras, M. (May, 2020). The impact of modality on temporal linguistic processing: a comparison of spoken and signed languages. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

57. Rivolta, C., Costello, B., & Carreiras, M. (September, 2020). How do visual modality and linguistic structure affect temporal processing of sign language?. Poster presentation at AMLaP-Architectures and Mechanisms for Language Processing. Potsdam, Germany. Online conference: https://amlap2020.github.io/

58. Souganidis, C., Molinaro, N., & Stoehr, A. (2020). Balanced Spanish-Basque bilinguals produce language-specific voice onset time in prevoiced plosives. Poster presentation at the 26th Architectures and Mechanisms for Language Processing Conference, Potsdam, Germany.

59. Stoehr, A., & Martin, C.D. (June, 2020). L1 grapheme-to-phoneme mappings influence L2 speech sound learning in production and perception. Poster presentation at the Conference on Multilingualism (COM) 2020, Reading, UK.

60. Taouki, I., Lallier,M., & Soto, D. (May, 2020). Metacognitive processing in early childhood. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

61. Termenon, M., Moia, S., Paz-Alonso, P., Molinaro, N., Mancini, S., Carrión-Castillo, A., Mazoyer, B., Tzourio-Mazoyer, N., Crivello, F., Carreiras, M., & Caballero-Gaudes C. (May, 2020). Covert sentence production in early bilinguals: A study in left and right handed participants. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

62. Termenon, M., Moia, S., Paz-Alonso, P.M., Molinaro, N., Mancini, S., Mazoyer, B., Tzourio-Mazoyer, N., Crivello, F., Carreiras, M., & Caballero-Gaudes, C. (June, 2020). Implications of handedness on language brain lateralization in early bilinguals. Poster presentation at Human Brain Mapping (2020 OHBM), Montreal, Canada.

63. Timofeeva, P., Carreiras, M., & Amoruso, L. (May, 2020). Linguistic control mechanisms in highly proficient bilinguals: An MEG study. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference.

64. Uruñuela, E., Jones, S., Crawford, A., Shin, W., Lowe, M., & Caballero-Gaudes, C. (June, 2020). Improving deconvolution of fMRI signal with Sparse Paradigm Free Mapping using stability selection. Poster presentation at Human Brain Mapping (2020 OHBM), Montreal, Canada.

65. Villameriel, S., Costello, B., Giezen, M., & Carreiras, M. (May, 2020). Cross-language activation in bimodal bilinguals. Poster presentation at Cognitive Neuroscience Society annual meeting (CNS 2020), Virtual Conference

Oral Presentations

1. Baese-Berk, M., Haupt, Z., Jaggers, Z., Samuel, A.G., Trebon, T., Wallace, M., & Wesson, A. (November, 2020). Production learning of non-native speech contrasts after training in perception or production. Oral presentation at the 61st Annual Meeting of the Psychonomic Society, Virtual Meeting.

2. Charoy, J., & Samuel, A.G. (November, 2020). Accommodation to foreign-accented speech: Different patterns for different accent strengths. Oral presentation at the 61st Annual Meeting of the Psychonomic Society, Virtual Meeting.

3. Dueme, F., Martin, C. & Stoehr, A. (January, 2020). The influence of L2 orthography on L1 speech production in immersed bilinguals. Oral presentation at the Conference of the Student Organisation of Linguistics in Europe (ConsOLE), Barcelona, Spain.

4. Esteban-Peñalba, T., Paz-Alonso, P.M., Navalpotro-Gomez, I., Boddy, P., Dacosta-Aguayo, R., Carreiras, M., & Rodriguez-Oroz, M.C. (December, 2020). Correlatos funcionales de inhibición de respuesta proactiva y contenida en la enfermedad de Parkinson con trastorno de control de impulsos. Oral presentation at the LXXII Annual Meeting of the Sociedad Española de Neurología, Virtual Meeting.

5. Furgoni, A., Stoehr, A., & Martin, C. (February, 2020). The influence of orthography on phonemic representations: Evidence from language perception and production. Oral presentation at 17th Old World Conference in Phonology (OCP17), Warsaw, Poland.

6. Heinzova, P., Mancini, S., & Carreiras, M. (October, 2020). Processing verb argument structure complexity in Basque-Spanish bilinguals. Oral presentation at Words in the World International Conference 2020 (WoW 2020), virtual conference.

7. Kim, D., Samuel, A.G., Kapnoula, E., & Dumay, N. (November, 2020). Reconciling subphonemic mismatch effects and other psycholinguistic tests of lexical engagement. Oral presentation at the 61st Annual Meeting of the Psychonomic Society, Virtual Meeting.

8. Lerma-Usabiaga, G. (October 2020). The gradient of population receptive field stimulus-dependence in ventral visual cortex. Oral presentation at Neuromatch Conference, virtual conference.

9. Lerma-Usabiaga, G. (June 2020). Computational generalization of neuroimaging software: the case of population receptive fields. Oral presentation at 2020 Vision Sciences Socity (VSS) meeting online.

10. Martorell, J., Mancini, S., Molinaro, N., & Carreiras, M. (December, 2020). Oscillatory tracking of syntactic structure and cross-linguistic variation. Oral presentation at International Conference of Psycholinguistic and Neurolinguistic Research: Methods, Materials, and Approaches, virtual conference.

11. Ordin, M. (April, 2020). Neuro-cognitive mechanisms of statistical learning in an evolutionary perspective. Oral presentation at EvoLang XIII, Special Theme "Evolution of the Extended Language System", Brussels, Belgium.

12. Ordin, M. (September, 2020). Re-synthesis and speech modification techniques in applied phonetics research. Oral presentation at workshop at the 3rd International Symposium on Applied Phonetics, Tarragona, Spain.

13. Ray, D., & Das, M. (October, 2020). Investigating Intero- and Exteroceptive predictive Processes in Major Depressive disorder. Interactive talk at Neuromatch conference 3.0, virtual conference.

14. Samuel, A.G., & Dumay, N. (November, 2020). What happens to sublexical and lexical representations after they have been used to understand speech? Oral presentation at the 61st Annual Meeting of the Psychonomic Society, Virtual Meeting.

15. Samuel, A.G., & Zheng, Y. (January, 2020). Is Lexically-Guided Phonetic Recalibration Critical for Accent Accommodation? Oral presentation at Workshop on Speech variation: Impact on perception and comprehension, Nice, France.

16. Stoehr, A., & Martin, C.D. (2020). Does orthography affect speech sound learning in production and perception? Oral presentation at the 2nd International Symposium on Bilingual and L2 Processing in Adults in Children (ISBPAC), Nijmegen, The Netherlands.

Invited Talks

1. Caballero-Gaudes, C., (June, 2020) Multi-echo beyond preprocessing. Invited talk at the 2020 meeting of the Organisation of Human Brain Mapping (2020 OHBM), Montreal, Québec, Canada.

2. Caffarra, S. (August, 2020). Linking neuroscience and education: Plastic brain changes related to reading acquisition. Invited talk at the Stanford ASEE's 2020 Summer Series, Stanford University, Stanford, USA.

3. Carreiras, M. (February, 2020) Neurociencia y Educación: Neuromitos, aprendizaje, y marcadores tempranos. Invited talk at 3º Congreso Mundial de Educación EDUCA 2020. Santiago de Compostela, Spain.

4. Carreiras, M. (October, 2020) El cerebro lector. Invited talk at Seminario " Leer con cabeza". Fundación Germán Sánchez Ruipérez. Virtual conference.

5. Costello, B. (October, 2020). Encoding in deaf readers: the role of phonology. Invited talk at the Brain Development & Education Lab, Stanford University, USA.

6. Lerma- Usabiaga, G. (November 2020). Replication, generalization and validation in Nueroimaging. Invited talk at the College of Biomed. Eng. Yuquan campus of Zhejiang University, China.

7. Lerma-Usabiaga G. (November 2020). A Validation framework for neuroimaging software. Invited talk at the Brainhack Donostia. San Sebastia, Spain.

8. Lerma-Usabiaga, G. (May 2020). Computational generalization of neuroimaging software. Invited talk at Vision and Perception Neuroscience Lab, Stanford University, Stanford, CA, USA.

9. Lerma-Usabiaga, G. (January 2020). A validation framework for neuroimaging software: the case of population receptive fields. Invited talk at Psychology Department, Stanford University, Stanford, CA, USA.

10. Mancini, S. (October 21-23, 2020). From features to relations: processing mechanisms at the syntax-discourse interface. Invited talk at Symposium on Linguistic Levels of Representations: Challenges at the Interfaces at the Society for the Neurobiology of Language Meeting, Philadephia, USA.

11. Martin, C.D. (May, 2020). On-line sentence comprehension adaptation when listening to foreign-accented speakers. Keynote speaker at Bilingualism and the Brain workshop, Tromso, Norway.

12. Paz-Alonso, P.M. (September, 2020). Functional specialization and plasticity in monolingual and bilingual populations. Invited talk at the 2nd Forum on Language Acquisition, Cognition and Brain Science. Beijing, China.

13. Ristic, B. (January, 2020). Lingvistika, koji psiho! Invited talk at the Linguistics seminar, Petnica Science Center, Valjevo, Serbia.

5.D PARTICIPANTS

The studies and scientific publications carried out by BCBL have been possible thanks to the voluntary participants, the majority of whom live in Gipuzkoa.

It is necessary to have a comprehensive database to be able to carry out our studies. To this end, the BCBL has developed numerous initiatives, previously mentioned in this document, highlighting the creation of a web system for the management of research studies.

The bulk of participants of our website, www.bcbl.eu/participa, is made up of more than 9 000 users aged between 18 and 78 years old, who, according to their linguistic profile, can enroll in BCBL studies.

Below are the main data on the users of our database and the number of participants that have participated in our studies.

Between 2017-2020, the BCBL has completed more than 20 000 experimental sessions involving more than 10 000 participants, thus providing an important grass-roots group in the local community for learning about and developing an appreciation for our research and scientific research more generally. Since the BCBL opened, the number of participants has increased, indicating that our efforts to interact with the local community and involve them actively in our mission have a very optimistic future trajectory.

In order to carry out all the experiments developed at the BCBL, the active participation of infants, children and adults —between 18 and 35 years old— and elderly participants is required.

These participants take part in tests using different techniques, such as behavioral techniques, Electroencephalography, Magnetoencephalography, Magnetic Resonance Imaging, and Eye Tracking.

The year 2020 has been different due to the impact of the pandemic, and the laboratory was closed coinciding with the beginning of the state of alarm and the closure lasted until September 1. During that period, we only opened it to carry out emergency studies related mostly to medical projects such as "Surgery in eloquent areas with awake patient".

As of September 1, 2020, strict measures were taken within the BCBL laboratories to be able to continue conducting experiments properly, according to the new safety and cleanliness requirements that this health situation demands.
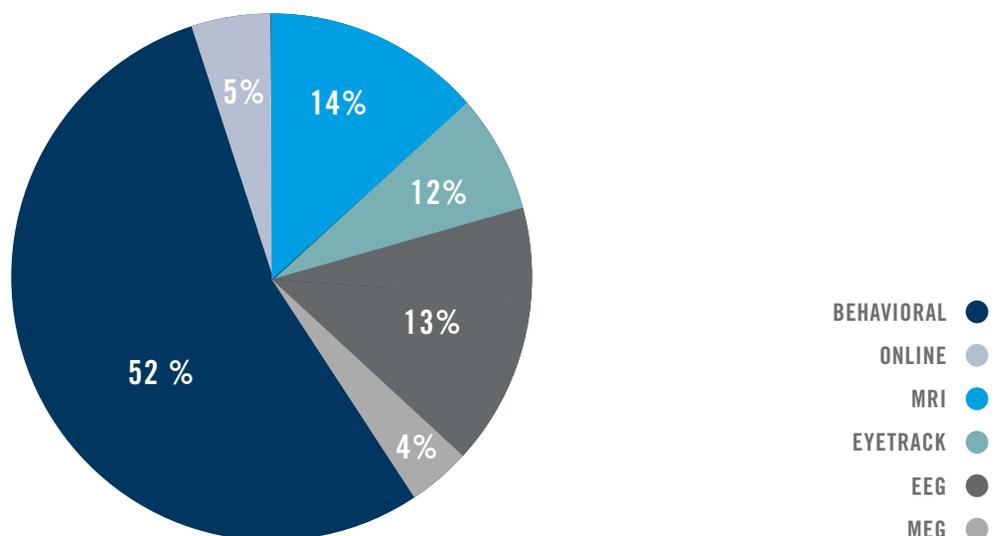
During this closure of the laboratory, we started with a new technique that is beginning to consolidate in laboratories around the world over the last few months: online experiments. The activation of this new way of participating has helped us to recover participants that were inactive and, therefore, we recovered them for the online experiments and, in some cases, even for the on-site experiments. During the lockdown, it has allowed us to have 758 participants, distributed between studies for adults and families. This way of participating makes it easier for us to have participants who live far from our main headquarters in Donostia.

These are the main figures regarding adult, children and baby participants and participation in experiments:

	BABYLAB	SCHOOLS	JUNIOR	FMRI	EYETRACK	EEG	MEG	BEHAVIORAL	MURCIA	Online	TOTAL
2017	431	900	600	372	575	502	188	2053	43		5664
2018	259	680	510	638	587	587	208	2306	100		5875
2019	481	1432	230	755	478	481	223	2132	150		6362
2020	430	994	319	194	17	261	36	847	153	759	4010
TOTAL											**21911**

PARTICIPATION PER YEAR

BEHAVIORAL ●
MEG ●
MRI ●
EYETRACK ●
EEG ●
BABYLAB ●
JUNIORLAB ●
MURCIA ●
SCHOOLS ●
ONLINE ●

5.D PARTICIPANTS

PARTICIPANTS 2017-2020

- BABIES
- KIDS
- ADULTS

7%
18%
75%
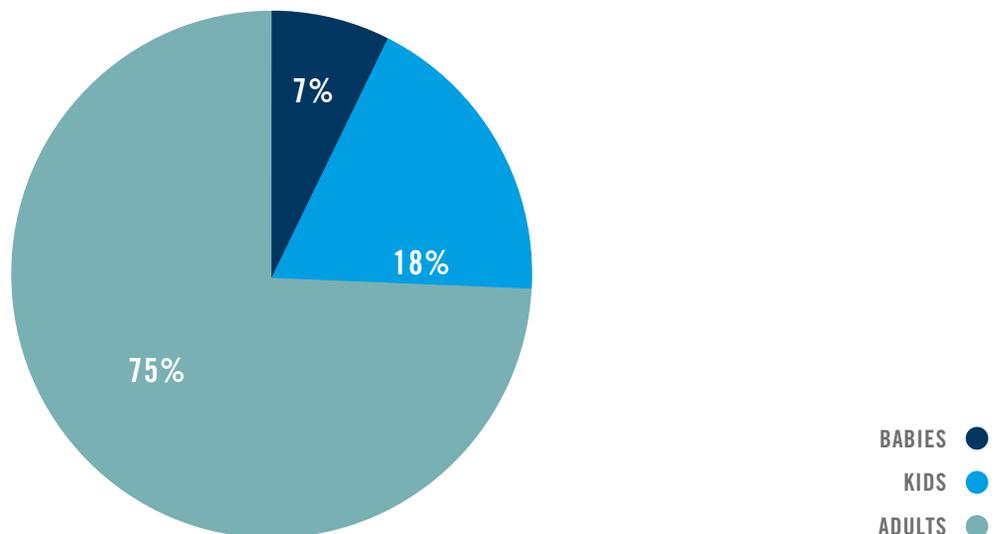
ADULTS PARTICIPATION & TECHNIQUES 2017-2020

- BEHAVIORAL
- ONLINE
- MRI
- EYETRACK
- EEG
- MEG

5%
14%
12%
13%
52 %
4%

06

SCIENCE OUTREACH AND VISIBILITY

6.A. ORGANIZATION OF CONFERENCES & WORKSHOPS

From its inception, the BCBL has played an active role in the promotion of research in cognitive neuroscience and language starting with the organization of international conferences and workshops that annually attract the most influential researchers in the cognitive neuroscience of language field: The BCBL organized and hosted 10 international conferences and workshops during the period 2017-2020.

These conferences are a natural environment for excellent research, the first step to internationalization, and the best opportunity for young researchers to learn and interact with the world leaders in the field.

These events are a great opportunity for the BCBL´s researchers to attend lectures, to discuss their work with other attendees and, of course, to expand their network.

During this period we have continued with the consecutive editions of "WILD", "IWoRDD" and "Statistical Learning" and we have also launched two new series of conferences: "WoRLD" and "International Workshop on Predictive Processing". Additionally, we have joined a global event named "Brain Hack".

ATTENDEES

2017

- **WILD, Workshop on Infant Language Development**
  (3 Keynote Speakers, 26 Oral Presentations, 55 Poster Presentations,
  110 Attendees)

- **ICIASL 2017**
  (4 Keynote Speakers, 31 Oral Presentations, 84 Poster Presentations,
  140 Attendees)

- **Cognitive Neuroscience: New Developments and Future Challenges**
  (5 Keynote Speakers, 15 Poster Presentations, 45 Attendees)

2018

- **Brain Hack**
  (2 Keynotes, 15 Oral presentations, 12 Poster presentations, 50 Attendees)

- **1st International Workshop on Predictive Processing**
  (3 Keynotes, 21 Oral presentations, 63 Poster presentations, 128 Attendees)

- **WoRLD, Workshop on Reading, Language and Deafness**
  (7 Keynotes, 9 Oral presentations, 42 Poster presentations, 108 Attendees)

- **WoRLD: From theory to practice**
  (10 Keynotes, 123 Attendees)

2019

- **Brain Hack**
  (5 Keynotes, 15 Oral presentations, 70 Attendees)

- **ICIASL 2019**
  (8 Keynotes, 31 Oral presentations, 88 Poster presentations, 186 Attendees)

- **IWORDD**
  (4 Keynotes, 18 Oral presentations, 40 Poster presentations, 113 Attendees)

- **IWORDD: From theory to practice**
  (6 Keynotes, 91 Attendees)

2020

- **Brain Hack Donostia 2020. Online edition**
  (4 keynotes, 12 Oral presentations, 251 Attendees)

2017

WILD
WORKSHOP ON INFANT LANGUAGE DEVELOPMENT

The third edition of WILD was held from June 15th to 17t.

The overarching goal of the "Workshop on Infant Language Development, WILD" is to bring together scientists with different perspectives and methodological approaches to the study of early language and cognitive development.

This scientific meeting was created to highlight recent research on a wide range of topics within monolingual and bilingual development, including speech perception and production; word learning; the development of syntax and morphology; brain mechanisms and first language acquisition; recent advances in infant brain imaging techniques (i.e., EEG, NIRS); atypical language development; language and cognition; early bilingualism; multilingual development; the role of culture in language development; gestures and non-verbal communication in infants and toddlers.

The first edition of this international conference was organized by the BCBL and held in San Sebastian with remarkable success. The second edition took place in Stockholm through the University of Stockholm; in 2017, it was again BCBL's turn to organize it.

Invited speakers

- **Janet Werker**
  University Killam Professor and Canada Research Chair in the Department of Psychology at the University of British Columbia

- **David Lewkowicz**
  Senior Scientist at Haskins Laboratories, Yale University

- **Takao Hensch**
  Professor, Molecular & Cellular Biology, Professor, Neurology (Children's Hospital), Center for Brain Science, Harvard University

ICIASL 2017

**The second edition of the "Statistical Learning" conference
was held from June 28th to 30th.**
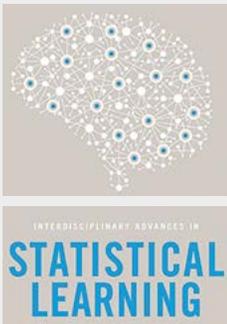
The aim of the conference was to bring together expert researchers on statistical learning and its underlying mechanisms with an interdisciplinary approach.

The conference put the focus on the scope of statistical learning, which is a hot topic in various domains such as language, vision, and audition, often studied independently. The aim of this conference is to bring together the main international experts to encourage a unified theoretical framework.

Invited speakers

- **Jenny Saffran**
  University of Wisconsin-Madison

- **Sharon Thompson-Schill**
  University of Pennsylvania

- **Simon Kirby**
  University of Edinburgh

- **Michael C. Frank**
  Stanford University

Theme speakers

- **Juan Toro**
  Pompeu Fabra University
  Cross-species Comparisons
  & Evolution

- **Linda Smith,**
  Indiana University Bloomington
  Development

- **Chris Conway**
  Georgia State University
  Statistical Learning in Special
  Populations

- **Dare Baldwin,**
  University of Oregon
  Vision, Action and Event Processing

COGNITIVE NEUROSCIENCE:
NEW DEVELOPMENTS AND FUTURE CHALLENGES

The scientific meeting under the name "Cognitive Neuroscience: future developments and new challenges" was held on July 22nd.

Five internationally renowned researchers, belonging to the BCBL's Advisory Board, talked about the recent advances and future avenues and challenges in their area of expertise, that is., Cognitive Neuroscience. Their insights on how Cognitive Neuroscience has developed after a similar meeting held in 2010, the future direction and challenges of this field and the expected new findings for the coming years were also discussed.

The neurocognitive research on language and other similar areas around cognition were discussed in this scientific meeting.

The invited speakers are considered to be the main international researchers in the field of language acquisition, which gives a remarkable scientific relevance to the event.

Keynote speakers

- **William Marslen-Wilson**
  Honorary Professor of Language and Cognition, Department of Psychology, University of Cambridge

- **Ron Mangun**
  Distinguished Professor of Psychology and Neurology, Department of Psychology, Director and Distinguished Professor of Psychology and Neurology, Center for Mind and Brain, University of California, Davis.

- **Anne Cutler**
  The MARCS Institute for Brain, Behaviour and Development, Western Sydney University

- **Tim Shallice**
  Tim Shallice, professor of neuropsychology and past director of the Institute of Cognitive Neuroscience, part of University College London

- **Jay McClelland**
  Jay McClelland, Lucie Stern Professor in the Social Sciences, Director, Center for Mind, Brain, Computation and Technology, Department of Psychology, Stanford University

2018

PREDICTIVE PROCESSING

**The first edition of the "Workshop on Predictive Processing"
was held from June 20th to 22nd.**

The first edition of this congress was about the neuropsychological mechanisms underlying predictive coding. The aim was to build bridges between researchers within the language field and experts on other research fields, such as vision, perceptive audition, attention, decision making, etc., in order to generate new insight into this novel scope.

Invited speakers & discussants

- **Sophie Scott**
  Professor of Cognitive Neuroscience, Speech Communication Leader at the UCL London's Global University

- **Moshe Bar**
  Director of the Gonda Multidisciplinary Brain Research Center at Bar-Ilan University

- **Pascal Fries**
  Ernst Strüngmann Institute (ESI) for Neuroscience in Cooperation with Max Planck Society.

Theme speakers

- **Julien Vezoli**
  Ernst Strüngmann Institute (ESI) for Neuroscience in Cooperation with Max Planck Society.

- **Matt Davis**
  MRC Cognition and Brain Sciences Unit, University of Cambridge

- **Gina Kuperberg**
  Cognitive Neuroscientist and Dennett Stibel Professor in Cognitive Science in the Department of Psychology and the Center for Cognitive Science at Tufts University, Boston

- **Lucia Amoruso**
  Basque Center on Cognition Brain and Language, BCBL

- **Craig Richter**
  Basque Center on Cognition Brain and Language, BCBL

- **Cristina Baus**
  University Pompeu Fabra | UPF · Center of Brain and Cognition (CBC)

READING, LANGUAGE AND DEAFNESS

**The first edition of the "Workshop on Reading, Language and Deafness"
was held from October 18th to 20th.**
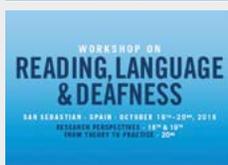
The first edition of this conference aimed at bringing together experts and researchers in the field of neurocognition of language regarding the deaf population as well as facilitating knowledge transfer between the interested parties and researchers.

The topics discussed during the conference included language processing and development within a context of deafness, taking sign language and both oral and written language as a reference point.

The conference was divided into two parts:

**Research Perspectives:
October 18th and 19th.**

During the first two days, the keynote speakers discussed the theoretical perspectives and empirical findings regarding topics related to neurocognition of language within a context of deafness. Their master conferences addressed language processing related to reading in the case of deaf individuals, sign language and language development with cochlear implants. The master conferences were complemented with poster talks and presentations selected among the received abstracts.

English was the language for communication and sign interpreting was provided to the universal language.

Keynote speakers

- **David Corina**
  Cognitive Neurolinguistics Lab, Center for Mind and Brain, University of California, Davis, USA.

- **Karen Emmorey**
  Laboratory for Language and Cognitive Neuroscience, School of Speech, Language, and Hearing Sciences, University of California, San Diego, USA.

- **Mairéad MacSweeney**
  Deafness, Cognition and Language Research Centre & Institute of Cognitive Neuroscience, University College London, United Kingdom.

- **Anu Sharma**
  University of Colorado Boulder, USA.

- **Bencie Woll**
  University College London, United Kingdom.

- **Christine Yoshinago-Itano**
  University of Colorado Boulder, USA.

FROM THEORY TO PRACTICE

October 20th
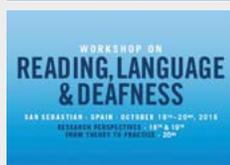
The third day aimed at creating a meeting point for researchers and other social agents, such as deaf persons, teachers, professionals and parents. WoRLD – from theory to practice consisted of plenary conferences addressed to a broad audience by international experts, followed by a round table to encourage discussion among the experts and the audience. During this event, simultaneous interpretation was provided in Spanish, English and SSL (Spanish Sign Language).

BRAIN HACK DONOSTIA 2018

**This was the first edition of Brain Hack Donostia. It was held from
May 2nd to 4th, 2018.**
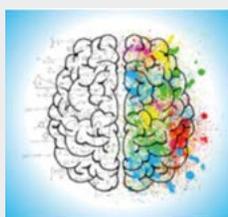
This was a satellite of the event
celebrated globally.

During the event, there was a
presentation on neuroimaging
techniques, such as fMR, diffusion,
MEG, EEG and fNIRS, from
preprocessing to data analysis
(connectivity and decodification).
During the event, participants were
encouraged to bring their projects
to develop and recruit collaborators
throughout the conference.

INTERDISCIPLINARY ADVANCES IN STATISTICAL LEARNING

**The third edition of the "Interdisciplinary advances in Statistical Learning"
conference was held between June 27th and 29th.**
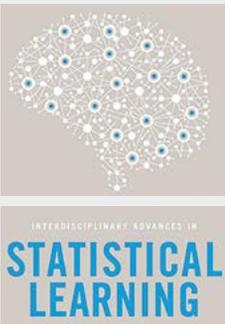
The conference was about statistical learning and its underlying mechanisms, from behavior to Neuroscience, in several domains of language, music, vision and audition, using data from adult participants, development, individual differences, computational models and non-human species.

Keynote speakers

- **Jay McClelland**
  Stanford University

- **Lori Holt**
  Carnegie Mellon University

- **Simon Kirby**
  University of Edinburgh

- **Daphna Shohamy**
  University of Columbia

INTERNATIONAL WORKSHOP ON READING AND DEVELOPMENTAL DYSLEXIA

The third edition of the "International Workshop on Reading and Developmental Dyslexia" was held from October 2nd to 4th.

iWORDD was created back in 2013 with the aim to bring together researchers interested in understanding the causes and manifestations of developmental dyslexia and attempts to address the theoretical issues faced in this field.

The conference was divided into two parts:

Research Perspectives: October 2nd and 3rd.

Across two full days, the third edition of iWORDD featured four excellent invited speakers whose theoretical views covered various issues related to the impact of cross-linguistic variations on the manifestations of reading development and reading disorders.

Questions linked to how structural differences amongst languages modulate reading acquisition and reading disorders were addressed as well as important timely issues such as multilingualism and second language learning.

Therefore, iWORDD offered the research community the opportunity to get a broad overview of the current cross-linguistic theories underlying research in the field, while helping outline future directions in the investigation of developmental dyslexia.

From theory to Practice: October 4th.

The third day aims at encouraging interaction and knowledge exchange among researchers, parents, teachers, and professionals. "IWORDD – From Theory to Practice" comprises two plenary conferences for a broader audience by international experts, followed by a round table. For this part of the conference, simultaneous translation to Spanish, Basque and English was provided.
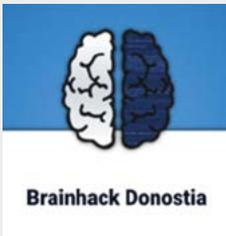
Keynote speakers

- **Charles Perfetti**
  University of Pittsburgh

- **Johannes Ziegler**
  Aix-Marseille Université | AMU · Laboratoire de Psychologie Cognitive (UMR 7290 LPC)

- **Ludo Verhoeven**
  University of Graz. Austria

- **Karin Landerl**
  University of Graz. Austria

THE BRAIN HACK DONOSTIA

The Brain Hack Donostia 2019 was held from May 5th to 8th.

Brainhack Donostia

This was the second edition of Brain Hack Donostia. It was held from May 5th to 8th, 2019.

This was a satellite of the event celebrated globally.

During the event, there was a presentation of neuroimaging techniques, such as fMRI, diffusion, MEG, EEG and fNIRS, from preprocessing to data analysis (connectivity and decodification).

Keynote speakers

- **Matteo Bastiani**
  Beacon Nottingham Research Fellow, Faculty of Medicine & Health Sciences

- **Dimitri Van De Ville**
  Geneva University

2020

THE BRAIN HACK DONOSTIA

The Brain Hack Donostia 2020 – online edition was held from November 9th to 13th.

This was the third edition of Brain Hack Donostia. It was a satellite of the event celebrated globally.
During the event, there was a presentation of neuroimaging techniques, such as fMR, diffusion, MEG, EEG and fNIRS, from preprocessing to data analysis (connectivity and decodification).

Participants were encouraged to bring their projects to develop and recruit collaborators throughout the conference.

The speakers were the following

- **Verena Heise**
  University of Oxford

- **Cassandra D. Gould van Praag**
  University of Oxford

- **Stefano Moia**
  Basque Center on Cognition Brain and Language, BCBL

- **Óscar Esteban**
  Lausanne University Hospital

- **Taylor Salo**
  Department of Psychology at Florida International University

- **Alex Gramfort**
  Institut national de recherche en sciences et technologies du numérique

- **Hubert Banville**
  Institut national de recherche en sciences et technologies du numérique

- **Richard Höchenberger**
  Institut national de recherche en sciences et technologies du numérique

- **Daniel Alcalá-López**
  Basque Center on Cognition Brain and Language, BCBL

- **Martina Vilas**
  Max-Planck-Institute AE in Frankfurt, Germany.

- **Michael Joseph**
  University of Michigan ???

- **Garikoitz Lerma-Usabiaga**
  Basque Center on Cognition Brain and Language, BCBL

Registration data

- 251 registrations
- 77% of the people registered for the first time for a Brainhack event.
- Affiliation in 14 countries: Austria, Belgium, Denmark, France, Germany, India, Italy, Mexico, Poland, Singapour, Saudi Arabia, Spain, United Kingdom, and the US.

BCBL organizes research seminars with participation of invited external speakers. All these seminars take place at the BCBL Auditorium and via zoom due to Covid 19. The access is free to the scientific community of the area and the announcements are posted at https://www.bcbl.eu/en/conferences.

Please find below the list of seminars organized by the BCBL:

2017

1. Elger Abrahamse. *Ghent University, Belgium.* February 9, 2017

2. Gabriella Vigliocco. *University College London, UK.* February 16, 2017

3. Juan Manuel Encinas. *Achucarro Center for Neuroscience, Bizkaia.* February 23, 2017

4. Maite Termenón. *Université Joseph Fourier, France.* March 9, 2017

5. Peter beim Graben & Serafim Rodrigues. *BCAM, Bilbao.* May 4, 2017

6. Prof. Elin Thordardottir. *McGill University, Canada.* May 16, 2017

7. Joaquín Goñi. *College of Engineering, Purdue University, US.* May 17, 2017

8. Hyojin Park. *Centre for Cognitive Neuroimaging, University of Glasgow, Scotland.* May 18, 2017

9. Dr. Michal Ben-Shachar. *The Gonda Brain Research Center and Department of English Literature and Linguistics, Bar Ilan University, Israel.* May 31, 2017

10. Suzanne Hut. *University of Helsinki, Finland.* September 19, 2017

11. Gojko Zaric. *Maastricht University, Netherlands.* October 30, 2017

2018

12. Darinka Trübutschek. *École des Neurosciences de Paris, France.* February 8, 2018

13. Ram Frost. *University of Jerusalem and BCBL affiliated researcher, Jerusalem and San Sebastian.* February 15, 2018

14. Jan Theeuwes. *Vrije Universiteit Amsterdam. The Netherlands.* February 22, 2018

15. Rafael Rebolo. *Institute of Astrophysics of Canary Islands. Canary Islands. Spain.* February 23, 2018

16. Rafael Yuste. *Columbia University, New York, US.* March 20, 2018

17. David Boas. *Maaschusetts General Hospital Director, Optics Division, Martinos Center, US.* March 23, 2018

18. Harald Baayen and Elnaz Shafaei. *Eberhand-Karis University Tübingen, Germany.* April 9, 2018

19. Caren M. Rotello. *University of Massachusetts Amherst, MA, US.* April 19, 2018

20. Jyothika Kumar. *University of Nottingham, UK.* May 10, 2018

21. Andrea Facoetti. *Universita di Padova, Italy.* May 17, 2018

22. Gina Kuperberg. *Tufts University, Medford, MA, US.* June 19, 2018

23. Özge Gürcanli. *McMurtry College, Rice University, Houston, TX, US.* June 26, 2018

24. Simon Fischer-Baum. *Department of Psychology, Rice University, Houston, TX, US.* June 28, 2018

25. Joseph T. Devlin. *Department University College London, UK.* October 4, 2018

26. Ezequiel Di Paolo. *University of Sussex, Brighton, UK.* October 25, 2018

27. Arild Hestvik. *University of Delaware, Delaware, USA.* November 22, 2018

28. Christophe Pallier. *Centre Neurospin, Gif-sur-Yvette, France.* December 13, 2018

2019

29. Thomas Bolton. *School of Life Sciences, Lausanne, Switzerland.* January 24, 2019

30. Fernando García Moreno. *Achucarro Basque Center for Neuroscience, Bizkaia, Spain.* February 28, 2019

31. Spyridoula Cheimariou. *The University of Alabama Speech and Hearing Center, Alabama, USA.* April 5, 2019

32. Noa Ofen. *Department of Psychology and Institute of Gerontology and the Merrill Palmer Skillman Institute, Wayne State University, Detroit, USA.* May 13, 2019

33.Usha Goswami. *University of Cambridge, UK.* May 17, 2019

34. Denis Burnham. *Western Sydney University, Sydney, Australia.* June 7, 2019

35. Joaquín Goñi. *College of Engineering, Purdue University, USA.* June 18, 2019

36. Begoña Díaz. *Universitat Internacional de Catalunya, Barcelona, Spain.* June 20, 2019

37. Charan Ranganath. *University of California at Davis, California, EEUU.* September 19, 2019

38. Eider M. Arenaza Urquijo. *Barcelona Beta Brain Research Center (BBRC), Spain.* October 21, 2019

39. Eneko Agirre. *University of the Basque Country. San Sebastian. Spain.* November 7, 2019

40. Luis M. Liz Marzán. *CIC biomaGUNE and Ciber-BBN. Ikerbasque, Basque Foundation for Science, San Sebastian, Spain.* November 19, 2019

41. Mario Archila Melendez. *Maastricht University, The Netherlands.* November 28, 2019

42. Chotiga Pattamadilok. *Centre National de la Recherche Scientifique (CNRS), Paris, France.* December 12, 2019

2020

43. Miguel Angel Sebastián. *Instituto de Investigaciones Filogóficas, UNAM, Mexico City.* January 9, 2020

44. Romy Lorenz. *Stanford University and the Max Planck Institute for Human Cognitive & Brain Science, UK.* January 14, 2020

45. Amanda Sierra. *Achucarro Basque Center for Neuroscience, Leioa, Bizkaia, Spain.* January 16, 2020

46. Sebastián Lipina. *Universidad de San Martin (UNSAM), Director Unidad de Neurobiología Aplicada, Buenos Aires, Argentina.* February 10, 2020

47. Raphael Kaplan. *Norwegian University of Science & Technology, Trondheim, Norway.* May 21, 2020

48. Molly Bright. *McCormick School of Engineering, Northwestern University, IL, US.* June 18, 2020

49. Boris Alexander Kleber. *Center for Music in the Brain, Department of Clinical Medicine- Aarhus University - Denmark.* August 27, 2020

50. Manuela Ruzzoli. *Institute of Neuroscience & Psychology, University of Glasgow, Scotland.* September 3, 2020

51. Ane Gurtubay-Antolin. *Crossmodal Perception and Plasticity laboratory (CPP-Lab), UCLouvain, Louvain-La-Neuve, Belgium.* September 10, 2020

6.C SCIENCE OUTREACH ACTIVITIES

The BCBL has performed several **dissemination activities** i) for the scientific community through conferences, seminars and congresses, and ii) for society at large through various media outlets.

In this second level, our communication activities pursue the following main objectives:

1. To publicize the existence of the BCBL and position it at the local, national and international levels as the Research Center of Excellence in Cognitive Neuroscience and Language.
2. To make the knowledge generated in the BCBL available to the society by disseminating to society at large the scientific advances achieved.

The BCBL actively promotes initiatives to create awareness of the research work it performs and the implications this research has for citizens. Outreach activities include introducing students from schools and universities to science, research, and innovation. Following the BCBL's philosophy, researchers receive specific training in "transfer and dissemination of research results", and share their research results with the general public via activities such as "Brain Awareness Week", "Pint of Science", "Elhuyar Zientzia Azoka", "SOMMA 100xCiencia", "Zientzia Astea UPV-EHU", etc.
One of the most remarkable events during this period is the "Brain Awareness Week". This science week has held four editions during this period, with remarkable success and a very high participation rate.

The aim of these events is to popularize Cognitive Neuroscience of Language and make it more comprehensive to society at large, using less scientific jargon than in regular conferences.

2017

BRAIN AWARENESS WEEK 2017

The overarching goal of this event is to make a complex subject, such as the brain, accessible to the general public. To this end, we organized several talks by experts in different disciplines related to the brain: neuroscience, cognitive psychology, and linguistics. A wide range of topics will be covered, such as emotions, decision making, perception, bilingualism and reading acquisition.

The week is divided into two parts: on the one hand, informative talks aimed at an adult public, given by a variety of experts from the BCBL, who explained in a very didactic way the insights of their research, such as the relationship between neuroscience and education, the link between memory and learning, or the difficulties some people have in performing mathematical calculations.

On the other hand, there were children workshops for scholars, aiming at teaching them about the functioning and structure of the brain through fun and educational activities: How do neurons work? How do the brains of different animals differ? Children had the opportunity to test their knowledge about the brain and learn what the brain of some animals look like. In 2017, 21 school groups participated, a total of about 630 children aged 6-12 years old.

I FORUM OF PROFESSIONAL TRAINING EXPERIENCE (I FORO DE LA EXPERIENCIA DE LA FP)

A total of 200 students of ESO attended on March the I Forum of Professional 10, 2017 the I Forum of Experience in San Sebastian of the professional training network.

The students of the 4th year of ESO participated in San Sebastian in the I Forum of Experience, organized by Hetel and Ikaslan, representing the professional training (FP) network of state-subsidized and state centers, together with the Scientific and Technology Park of Gipuzkoa (San Sebastian), aiming at awakening "scientific vocation".

The goal of this initiative was to bring young students closer to the reality of the companies in the park. The BCBL contributed by hosting two groups of young students and showing them three different job positions developed by staff with FP type of training.

PINT OF SCIENCE 2017

This is a new platform that allows people to talk about science with the researchers conducting the studies. It is a non-profit organization, run by volunteers, that was created by a community of postgraduate and postdoctoral researchers back in 2012. The festival is held annually for three days simultaneously in bars all around the world. In 2017, the BCBL contributed to San Sebastian edition with the following 6 talks:

Mechanisms of the brain
- The unconscious brain
- Reading at the brain's pace

Neuroscience and Language
- How to read in a language you have never heard?
- How to detect bullshit in cognitive neuroscience

More than words
- Nose or noise? Sniffing out words in a crowd.
- Foreign accents: myths vs. reality

6.C SCIENCE OUTREACH ACTIVITIES

EXHIBITION AND TALK ABOUT DYSLEXIA AND SPECIFIC LANGUAGE IMPAIRMENT IN PEÑAFLORIDA HIGH SCHOOL IN SAN SEBASTIÁN

On May 25, a training day was held for the teaching staff of the Peñaflorida High School in San Sebastian on Dyslexia and Specific Language Impairment. This day was the closing event of two weeks of exhibition of information posters created by the BCBL, displaying information on those two impairments along the teachers' corridors. With this event, we tried to (i) meet the needs the teaching staff conveyed to us and (ii) disseminate the research work carried out at the BCBL with these two specific groups.

END OF YEAR EVENT CARMELITAS SAGRADO CORAZÓN SCHOOL

Our JuniorLab is located inside the Carmelitas Sagrado Corazón school. Every year, coinciding with the end of the school year, the researchers who have carried out studies at the school hold an event to disseminate the research lines and the results of the studies. Parents, teachers and representatives from several institutions attend this event every year.

"EMPOWERING STUDENTS TO EUROPEAN CITIZENSHIP (ESEC)"

La Anunciata school organized an event about their project named "Empowering Students to European Citizenship (ESEC)". Representatives of several educational centers, various authorities from the San Sebastian City Council, the Regional Government of Gipuzkoa, the Basque Government,

Kristau Eskola school and several institutions related to the area of education attended this event. Furthermore, this event served to present the research project carried out at the BCBL together with Erasmus+ students. This project aims at measuring the brain changes associated with learning a third language using behavioral tests on the computer and neuroimaging techniques, such as the MRI. These brain changes may be translated into control processes characterized as voluntary and cognitively demanding, which seem to vary by the effect of the third language.

2018

ELHUYAR ZIENTZIA AZOKA (ELHUYAR SCIENCE FAIR)

The "Zientzia Azoka" or science fair hosts projects carried out by young people; it is an opportunity for them to experience and approach scientific research and technology development. The result is the opportunity to present their project at a fair stand at the Zientzia Azoka, located in Plaza Nueva in Bilbao.

All the boys and girls participating in this event were assisted by professionals in the research area to carry out their work.

The overarching goals are promoting scientific culture among society, exercising the young students' ability in the scope of science and technology, promoting scientific-technical vocation and bringing people belonging to the aforementioned areas and participants together. Teenagers between 12 and 18 years old participated, organized in groups of between 2 and 4 pax.

To this end, BCBL collaborated by offering a stay at our research center to one group of students of the San Benito Ikastola school in Lazkao, advising them on their experiment about optical illusions.

BRAIN AWARENESS WEEK 2018

The Brain Awareness Week is an international campaign to raise awareness on the progress and advantages of research related to the brain. It is coordinated by "Dana Alliance for Brain Initiatives" and "European Dana Alliance for the brain". Every year, schools, universities, hospitals, research centers and

other organizations worldwide join together in their efforts to disseminate all the knowledge about the brain, neuroscience and other related areas.

The main goal of this event is to make a topic a complex topic, such as the brain, accessible to the general public. To this end, we organize several talks by experts on a variety of disciplines related to the brain: neuroscience, cognitive psychology, and linguistics. A broad range of topics will be discussed, such as emotions, decision making, perception, bilingualism and reading acquisition.

The week is divided into two parts: on the one hand, dissemination talks for an adult audience given by different BCBL experts, about topics such as the relationship between neuroscience and education, the link between memory and learning, or the difficulties some people have to do mathematical calculations.

On the other hand, there were several infant workshops for scholars, aiming at teaching them the functioning and structure of the brain through fun and educational activities. How do neurons work? How do the brains of different animals differ? Children will be able to test their knowledge of the brain and see how some animals' brains are. During 2018, a total of 17 groups of scholars participated, with up to 500 children between 6-12 years old.

6.C SCIENCE OUTREACH ACTIVITIES

II FORO DE LA EXPERIENCIA DE LA FP (II FORUM OF PROFESSIONAL TRAINING)

A total of 200 students of ESO (Secondary School) attended the II Forum of Professional Training Experience around the professional training network held on 8 March, 2018 in San Sebastian.

The students of the 4th year of ESO participated in the II Forum of Experience, organized in San Sebastian by Hetel and Ikaslan, which represent the network of both the state-subsidized and state professional training (FP) centers of the Basque Country, together with the Scientific and Technology Park of Gipuzkoa (San Sebastian), aiming at awakening "scientific vocation".

The goal of this initiative was to bring young students closer to the reality of the companies in the park. The BCBL contributed by hosting two groups of young students and showing them three different job positions developed by staff with FP type of training.

PINT OF SCIENCE 2018

This is a new platform that allows people to talk about science with the researchers involved in studies. It is a non-profit organization, run by volunteers, and created by a community of postgraduate and postdoctoral researchers back in 2012. The festival is held annually for three days simultaneously in bars all around the world. In 2018, the BCBL contributed to the San Sebastian edition with the following 6 talks:

Brain mechanisms
- The unconscious brain
- Reading at the brain's pace

Neuroscience and Language
- How to read in a language you have never heard
- How to detect bullshit in cognitive neuroscience

More than words
- Nose or noise? Sniffing out words in a crowd.
- Foreign accent: myths vs. reality

END OF YEAR EVENT CARMELITAS SAGRADO CORAZÓN SCHOOL

Our JuniorLab is located inside the Carmelitas Sagrado Corazón school. Every year, coinciding with the end of the school year, the researchers who have carried out studies at the school hold an event to disseminate the research lines and results of the studies. Parents, teachers and representatives from several institutions attend this event every year.

2019

SEMANA DEL CEREBRO

BRAIN AWARENESS WEEK 2019

The Brain Awareness Week is an international campaign to raise awareness on the progress and advantages of research related to the brain. It is coordinated by "Dana Alliance for Brain Initiatives" and "European Dana Alliance for the brain". Every year, schools, universities, hospitals, research centers and other organizations worldwide join together in their efforts to disseminate all the knowledge about the brain, neuroscience and other related areas.

The main goal of this event is to make a complex topic, such as the brain, accessible to the general public. To this end, we organized several talks given by experts in different disciplines related to the brain: neuroscience, cognitive psychology, and linguistics. A broad range of topics will be discussed, such as emotions, decision making, perception, bilingualism and reading acquisition.

The week is divided into two parts: on the one hand, there were several infant workshops for scholars, aiming at teaching them the functioning and structure of the brain through fun and educational activities. How do neurons work? How do the brains of different animals differ? Children will be able to test their knowledge of the brain and see what some animals' brains look like.

On the other hand, in 2019 and for the first time, we substituted the talks addressed to the adult public for a fair for adults and children, aiming at approaching families to science through the following stands full of interactive activities of different levels of difficulty.

Let´s challenge your brain!

You will see how our brain likes to make associations and how good it is at it. Besides, we will challenge your brain with words and colors. Are you up for the challenge?

Your senses deceive you

Do you trust your sight? What about your hearing? Or your sense of touch? Discover why you should not trust any of these senses during this activity: optical illusions, auditory illusions and the unbelievable illusion of the elastic hands. We will trick your brain to make you believe you have a hand that does not belong to you!

Learning about neurons

What is a neuron? How does it work? We will make a neuron model to be able to understand its structure. Besides, we will see on a screen how the neurons in your brain communicate with each other through electricity. In this activity, participants' hair may get dirty.

Your brain revealed

Discover how your brain works and learn what happens in each area through real images taken with magnetic resonance. We will also make a brain model that you will take home as a hat!

Emotions, do we feel them or think them?

How would you react if had a bear in front of you? How would you feel if your best friend gave you unexpectedly your favorite box of chocolates? Come and see what happens in your brain and your body when you experience different emotions.

Are the eyes the windows of the brain?

Did you know that we can observe how eyes move to unravel how your brain works? You will discover how the brain manages words, images and even the world around us with your eyes.

What makes us unique? Compare your brain with that of other animals

The structure of the brain is like a map of a country, with different regions and roads connecting them. Discover with us how this map has changed throughout evolution. In this activity, you will see dissections of real animals' brains.

What is dementia?

Do you know anybody with dementia? Learn what happens in their brains and why they don´t work like yours. You will also learn about what you can do to help.

In 2019, 14 groups of scholars participated with 350 children between 6-12 years of age.

III FORUM OF PROFESSIONAL EXPERIENCE (III FORO DE LA EXPERIENCIA DE LA FP)

A total of 200 students of ESO (Secondary School) attended the III Forum of Professional Training Experience around the professional training network held on March 2019 in San Sebastian.

The students of the 4th year of ESO participated in the III Forum of Experience, organized in San Sebastian by Hetel and Ikaslan, which represent the professional training (FP) network of centers, together with the Scientific and Technological Park of Gipuzkoa

(San Sebastián), aiming at awakening "scientific vocation".

The goal of this initiative was to bring young students closer to the reality of the companies belonging to the park. The BCBL contributed by hosting two groups of young students and showing them three different job positions developed by staff with FP type of training.

PINT OF SCIENCE 2019

This is a new platform that allows people to talk about science with the researchers involved in studies. It is a non-profit organization, run by volunteers, and created by a community of postgraduate and postdoctoral researchers back in 2012.

The festival is held annually for three days simultaneously in bars all around the world. In 2019 the BCBL contributed to the San Sebastian edition with the following 6 talks:

- In Search of Intelligence
- Deconstructing "empathy" to understand others
- Do you follow my pace? A brain mechanism for languages
- Do we know when we make an error?
- Languages, a product of our mind
- Neuroscience and Education: How much should teachers know about the brain?

2019

1OOXCIENCIA 4

The annual event organized by the SOMMA alliance (Severo Ochoa centers and Unidades Maria de Maeztu) in 2019 was co-organized by BCBL and a transfer fair in which under the title "What does science do for you?". This edition showed specific cases of success in the translation of research into products, services, or business ideas that materialized in spin-offs that have ended up having an impact on people's lives. The initiatives exhibited showed the impact of R&D&I on society.

OLATU TALKA

On June 1 we participated in the "Olatu Talka" initiative with several neuroscientific workshops addressed to Primary children in the UrbanZientzia marquee.

SCIENCE WEEK
(ZIENTZIA ASTEA)

The BCBL contributed to the Science Week 2019 with two activities:
On the one hand, with a workshop about the brain for children and, on the other hand, with a talk given by Manuel Carreiras on optical illusions.

END OF YEAR EVENT CARMELITAS SAGRADO CORAZÓN SCHOOL

Our JuniorLab is located inside the Carmelitas Sagrado Corazón school. Every year, coinciding with the end of the school year, the researchers who have carried out studies at the school hold an event to disseminate the research lines and the results of the studies. Parents, teachers and representatives from several institutions attend these events every year.

2020

SCIENCE OUTREACH ACTIVITIES

The year 2020 was marked by the cancellation of our science outreach activities.

The **Brain Week 2020** was scheduled to start the weekend in which the state of alarm was declared and, unfortunately, we had to cancel it.

Other face-to-face outreach activities have been canceled and will be resumed when the health situation improves:

FACEBOOK LIVE INTERVIEWS

However, to compensate for this lack of face-to-face activities, we created a series of interviews broadcasted on Facebook Live, in which our followers could ask our researchers all sorts of questions.

The FB Live initiative has generated a very significant number of views (4,785), both during the live session and in the following days, once the videos were posted on the wall. The reach is also very positive compared to that of other publications.

- The number of interactions follows the same positive trend. All videos have generated at least the same number of interactions as the most successful BCBL publications.

- The comments are positive, and in all the sessions we received comments congratulating the center for the initiative.

- In addition to the advantages for BCBL's external community, this action also has a positive impact on internal communication. In this complicated period of the global pandemic, it is important to reinforce the sense of belonging to the institution of its own researchers. This initiative makes them feel part of a leading organization at the forefront of research, where they share space with other high-level researchers.

GUIDED EDUCATIONAL VISITS

During the 2017-2020 period, 2500 students from schools, "euskaltegis" (Basque language school), professional training centers and universities visited the BCBL. In these visits, students listen to a brief talk about our center (aims, research lines) and several researchers explain specific examples of their research.

Then, they take a guided tour around the labs aiming at knowing the techniques used in Neuroscience and encouraging them to participate, demystifying laboratories and the fears they may cause.

These visits, apart from promoting our center, offer a practical vision of the research world so that students can see it as a possibility for their future. The visits were paused with the beginning of the state of alarm and we are resuming them in small groups and applying a safety and hygiene protocol.
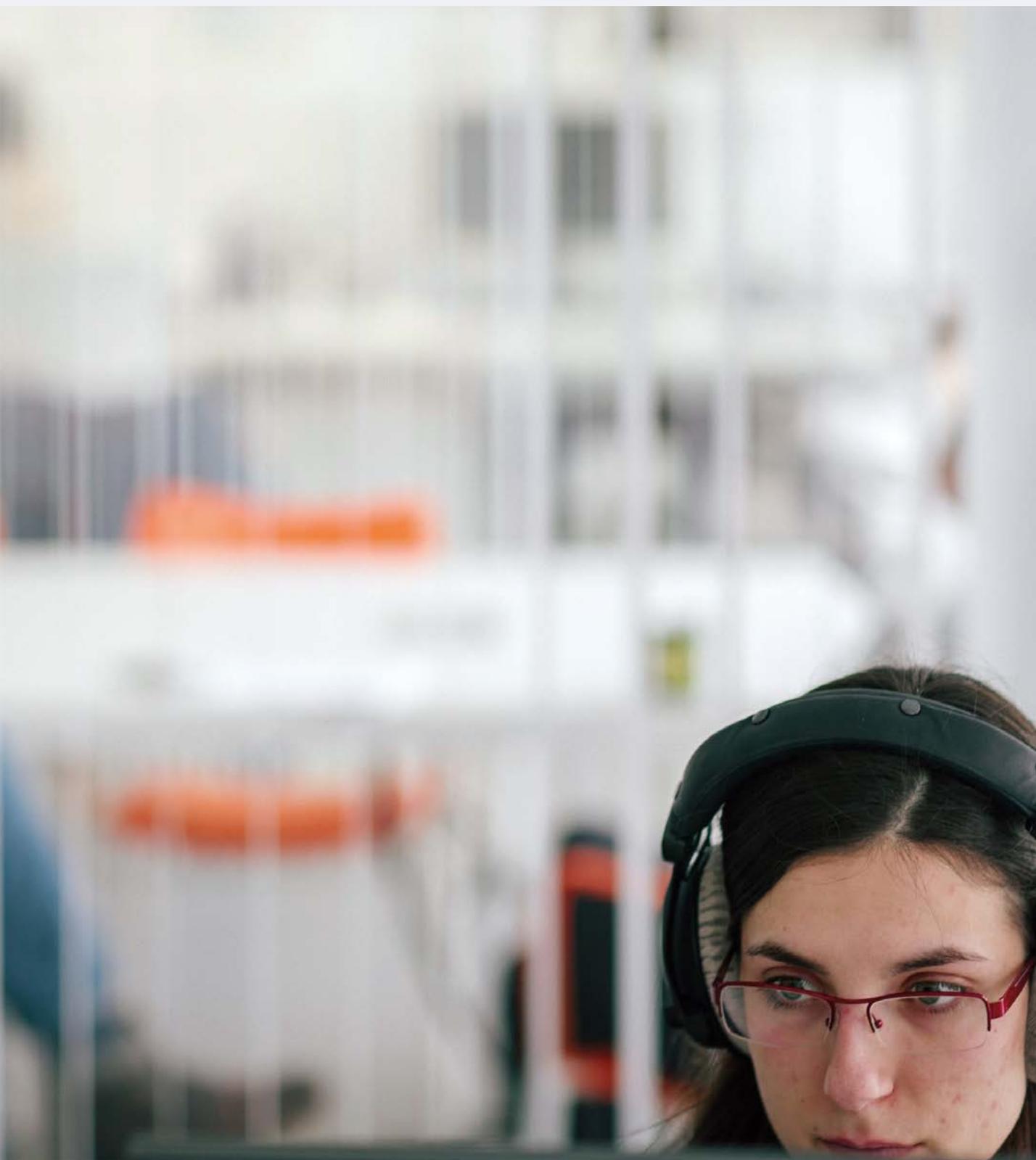
6.D BCBL IN THE MEDIA

Besides, to disseminate the knowledge generated in the BCBL, the BCBL made a qualitative leap in 2017-2020 thanks to its presence in the national media and its entry into the social networks. The dissemination and communication benchmarks achieved by the BCBL are as follows:

After starting with sporadic appearances in local media, a fortnightly presence in the local and national communication media has been achieved during this period.

In addition to achieving certain public recognition in the media thanks to the milestones attained by the center, the BCBL is regularly consulted by different media as an expert adviser in cognitive neuroscience, management in the scientific field and promotion of scientific vocation among the youth.

The BCBL is also very active in national communication media and social networks. The benchmarks for dissemination and communication achieved by the BCBL in the 2017-2020 period are as follows: 1520 total media appearances; 1972 new followers on Facebook (totaling 5301 followers); 1432 new followers on Twitter (totaling 3191 followers); the creation of an Instagram channel with 550 followers and 7000 Youtube views.

In this sense, the 2017-2020 period has had a significant presence, both in national and international media, totaling more than 1520 impacts and generating audiovisual material on research results.

During 2020, the media related to health and science has been filled with news about the coronavirus and, although we have maintained our commitment to publicize our findings and research milestones, it has been more difficult for us. Even so, we obtained very significant impacts.

The dissemination and communication milestones achieved by the BCBL during this period are:

Conventional channels

On the other hand, regarding online media, print media, radio and television, the BCBL had 1526 impacts over the 2017-2020 period.

TOTAL MEDIA APPEARANCES
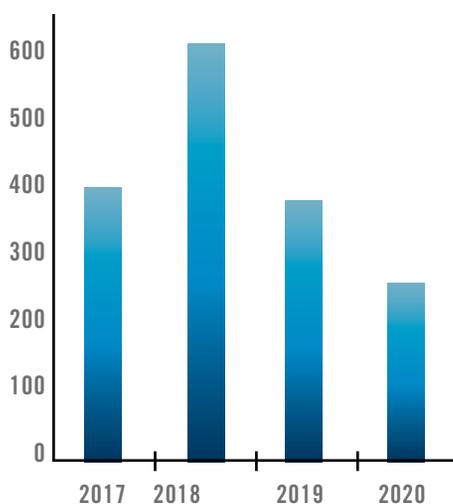
6.D BCBL IN THE MEDIA

Regarding social media

Generally speaking, we could say that the center's activity on social media follows a positive trend, both in the number of followers and the interactions achieved. Having a growing community on social media is positive for the center, as it allows for the message to reach more people. Social media provides us with an alternative option to be present on the media in order to inform society of the center's activity. Given the statistics on the shared content, the strategy based on disseminating content to others has been a resounding success; this has enlarged our follower base, which is beneficial when publishing content about the center or searching for participants for our studies.

Social networks

Below is a graph that provides information about the activity and evolution of our follower figures on Facebook, Youtube and Twitter. In general terms, the results are positive and confirm the existence of a digital community that follows the center's activity on social media.

Nowadays, the BCBL's Twitter account has **3131 followers**, compared to the 1759 followers in 2016.

The BCBL's Facebook account currently has 5301 followers, compared with the 3329 it had in 2016. The BCBL's Facebook account shares information about neuroscience daily and is always reviewed by experts from our center, thus becoming a reference account in the field of Neuroscience.

The BCBL has a Youtube channel in which it stores a total of **95 videos** that have **generated 38 353 views** since its creation.

During this period, we have created an Instagram channel aiming at approaching the younger segment of our followers and offer more dynamic and visual content; nowadays, this channel has 550 followers.

It mainly shares **informative content** that is divided into the BCBL's researchers' content and talks or presentations on topics related to the center.

FACEBOOK ●
TWITTER ●
INSTAGRAM ●
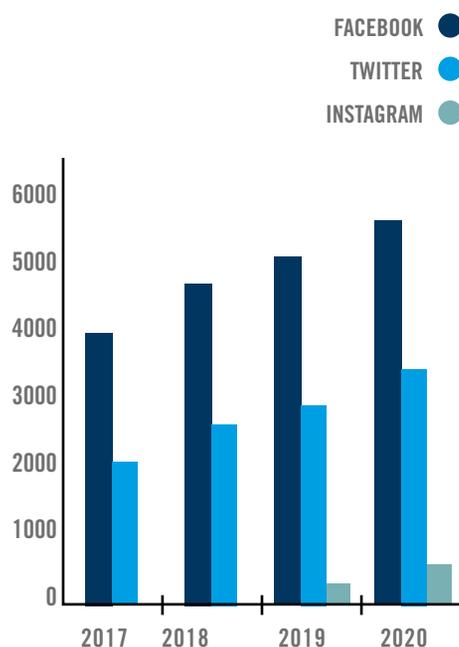
7.A MASTER IN COGNITIVE NEUROSCIENCE OF LANGUAGE
7.B PHD PROGRAMS
7.C TALENT RECRUITMENT AND RETENTION

07

TEACHING AND TALENT

The BCBL seeks to attract the best researchers and cares about their long-term learning. High-quality training is critical to stay at the forefront of methodological and theoretical knowledge. We allocate a significant part of our budget to the development, implementation, and organization of training events.

The three major training programs (the Master's and 2 PhD programs) are run in the BCBL facilities and coordinated by BCBL members, in partnership with the UPV/EHU. Other informal training programs (e.g., courses on Matlab, Fieldtrip, etc.) are organized periodically by different members of the BCBL.

MASTER IN COGNITIVE NEUROSCIENCE OF LANGUAGE
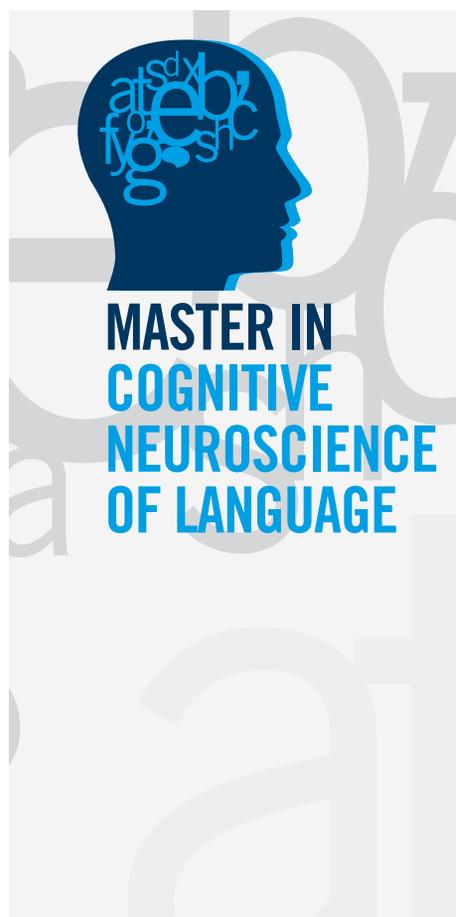
The **Master's in Cognitive Neuroscience of Language** has been taught since the academic year 2011-2012. One of the aims of this graduate program is to train interdisciplinary researchers in the Cognitive Neuroscience of Language to advance further and transfer this knowledge to the areas of Health and Education. The program allows the degree holder to pursue a research career by developing a PhD thesis. The duration of the program is one academic year, with 60 ECTS credits. The students develop research skills through the mentorship of experts and by completing the Master's Research Project at the end of the program.

Main details:

[Academic director: Manuel Carreiras

[Duration: One academic year, 60 ECTS (European Credits Transfer System)

[Language of instruction: English

[Lecturers: 28 per year approximately

[Subjects: 2 compulsory courses and 13 optional, of which 8 may be chosen by each student. 36 ECTS

[Final Master's Dissertation: 24 ECTS

The figure below shows the evolution of the pre-enrollments and enrollments to the Master's, in which the interest for the program at international level is reflected. There is always a maximum number of enrollments for students with the best academic records, therefore ensuring quality teaching through personalized attention.

APPLICATIONS AND ENROLLMENTS
DURING 2017-2020

APPLICATIONS ━━
ENROLLMENTS ━━

60		54	
50			50
44			
	37		
40			
30			
20			
12	13	9	11
10			
0			
2017/2018	2018/2019	2019/2020	2020/2021
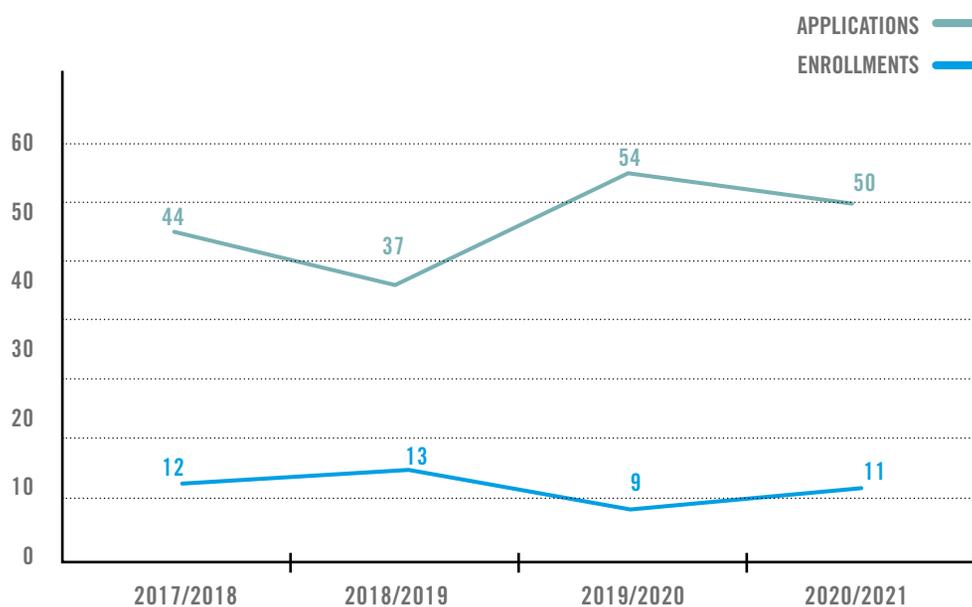
7.B PHD PROGRAMS

In September 2013, the BCBL, together with the UPV/EHU, launched a program that was approved by ANECA, the PhD program in Linguistics. Later on, in September 2018, the BCBL, again with the UPV/EHU, launched a doctoral program that was approved by ANECA, the PhD program in Cognitive Neuroscience which BCBL runs entirely.

During the 2017-2020 period, 26 theses have been defended. From these 26 PhD students 18 belong to the University of the Basque Country, one of our main collaborators and partners; 16 of these theses were defended in the Linguistics program, 1 in the program of Molecular Biology and Biomedicine, and one first thesis was already defended in our new program of Cognitive Neuroscience. We have 3 more successful PhD students that were enrolled in other PhD programs within the national scope that were supervised by our researcher and/or who have developed their thesis at the BCBL. Apart from these 21 PhD students, 5 were supervised by researchers of the BCBL at international universities, such as Western Sydney University, University of Pisa, Hebrew University, or Stony Brook University.

All PhD students are required to spend at least three months in another lab abroad.

Many technical training courses have been carried out to improve the skills of our scientists and lab personnel (MEG, fMRI, etc.).

Doctoral Theses 2017-2020

1) LEXICAL PREDICTION MECHANISMS IN EARLY BILINGUAL SPEAKERS

a. Supervisors: Maria Teresa Guasti & Nicola Molinaro
b. PhD student: **Francesco Giannelli**
c. Defended in 2017 (no grading system)

2) SPEECH-BRAIN SYNCHRONIZATION: A POSSIBLE CAUSE FOR DEVELOPMENTAL DYSLEXIA

a. Supervisors: Nicola Molinaro & Marie Lallier
b. PhD student: **Mikel Lizarazu**
c. Defended in 2017 (Summa cum laude)

3) BILINGUALISM ACROSS THE LIFESPAN: NEUROANATOMICAL CORRELATES

a. Supervisors: Manuel Carreiras & Jon Andoni Duñabeitia
b. PhD student: **Lorna García**
c. Defended in 2017 (Summa cum laude)

4) MULTIMODAL MRI CHARACTERIZATION OF VISUAL WORD RECOGNITION: AN INTEGRATIVE VIEW

a. Supervisors: Pedro M. Paz Alonso & Manuel Carreiras
b. PhD student: **Garikoitz Lerma**
c. Defended in 2017 (Summa cum laude)

5) THE SEARCH FOR A BILINGUAL ADVANTAGE IN EXECUTIVE FUNCTIONS: A DEVELOPMENTAL PERSPECTIVE

a. Supervisors: Jon Andoni Duñabeitia & Manuel Carreiras
b. PhD student: **Eneko Antón**
c. Defended in 2017 (Summa cum laude)

6) THE PROCESSING OF GENDER INFORMATION IN LANGUAGES OF DISTINCT MORPHOSYNTACTIC GENDER MARKING SYSTEMS

a. Supervisors: Nicola Molinaro & Manuel Carreiras
b. PhD student: **Jui-Ju Su**
c. Defended in 2017 (Summa cum laude)

7) EEG AND MEG EVIDENCE OF A PREDOMINANT NUMBER CODE IN BILINGUALS AND ITS SIGNIFICANCE FOR DEVELOPMENTAL DYSCALCULIA

a. Supervisors: Elena Salillas & César Caballero
b. PhD student: **Alejandro Martínez**
c. Defended in 2017 (Summa cum laude)

8) CHANGES IN BRAIN ACTIVITY DURING LANGUAGE LEARNING IN ADULTS MEASURED BY MAGNETOENCEPHALOGRAPHY

a. Supervisors: Doug Davidson & César Caballero
b. PhD student: **Ainhoa Bastarrika**
c. Defended in 2017 (Summa cum laude)

9) PHONOLOGICAL AND ORTHOGRAPHIC PROCESSES IN SPANISH DEAF SKILLED READERS

a. Supervisors: Manuel Carreiras & Jon Andoni Duñabeitia
b. PhD student: **Noemí Fariña**
c. Defended in 2017 (Summa cum laude)

10) IDENTIFICACIÓN DE VARIANTES GENÉTICAS IMPLICADAS EN EL DESARROLLO DE DISLEXIA Y FALTA DE ATENCIÓN: ESTRATEGIAS DE CASO-CONTROL Y LOCI DE RASGOS CUANTITATIVOS

a. Supervisors: Ana María Aransay & Manuel Carreiras
b. PhD student: **Mirian Sanchez**
c. Defended in 2017 (Summa cum laude)

11) STATISTICAL LEARNING AS AN INDIVIDUAL ABILITY

a. Supervisor: Ram Frost
b. PhD student: **Noam Siegelman**
c. Defended in 2018 (No grading system)

12) THE RELATIONSHIP BETWEEN PHONEMIC CATEGORY BOUNDARY CHANGES AND PERCEPTUAL ADJUSTMENTS TO NATURAL ACCENTS

a. Supervisor: Arthur Samuel
b. PhD student: **Yi Zheng**
c. Defended in 2018 (No grading system)

13) THE VISUAL ATTENTION SPAN AS A MEASURE OF ORTHOGRAPHIC GRAIN SIZE: EFFECTS OF ORTHOGRAPHIC DEPTH AND MORPHOLOGICAL COMPLEXITY

a. Supervisors: Marie Lallier & Manuel Carreiras
b. PhD student: **Alexia Antzaka**
c. Defended in 2018 (Summa cum laude)

14) INVESTIGATION OF THE DEVELOPMENT OF NEURAL AND BEHAVIOURAL AUDITORY RHYTHMIC SENSITIVITY AND OF ITS CONTRIBUTION TO READING ACQUISITION

a. Supervisors: Marie Lallier & Nicola Molinaro
b. PhD student: **Paula Ríos**
c. Defended in 2018 (Summa cum laude)

15) THE DEVELOPMENT OF AUDIOVISUAL VOWEL PROCESSING IN MONOLINGUAL AND BILINGUAL INFANTS: A CROSS-SECTIONAL AND LONGITUDINAL STUDY

a. Supervisors: Monika Molnar & Eiling Yee
b. PhD student: **Jovana Pejovic**
c. Defended in 2019 (Excellent)

16) DEPRESSION AND ANXIETY IN THE POSTNATAL PERIOD: AN EXAMINATION OF MOTHER-INFANT INTERACTIONS AND INFANT LANGUAGE DEVELOPMENT

a. Supervisors: Marina Kalashnikova, Denis Burnham & Janet Conti
b. PhD student: **Ruth Brookman**
c. Awarded in 2019 (No grading system)

17) JELLYS: DESARROLLO Y EVALUACIÓN DE UN VIDEOJUEGO PARA MEJORAR LA LECTURA EN NIÑOS CON DISLEXIA A TRAVÉS DEL ENTRENAMIENTO RÍTMICO Y DE LA ATENCIÓN VISUAL

a. Supervisors: Javier Bernácer & Marie Lallier
b. PhD student: **Mikel Ostiz**
c. Defended in 2019 (Excellent)

18) OSCILLATORY CHARACTERIZATION OF SENSORY WORDFORM PRE-ACTIVATION IN THE VISUAL AND AUDITORY DOMAINS

a. Supervisors: Nicola Molinaro & Mathieu Bourguignon
b. PhD student: Irene Fernández
c. Defended in 2019 (Summa cum laude)

19) MECANISMOS FISIOPATOLÓGICOS DEL TRASTORNO DE CONTROL DE IMPULSOS EN LA ENFERMEDAD DE PARKINSON

a. Supervisor: Mari Cruz Rodríguez Oroz
b. PhD student: Irene Navalpotro
c. Defended in 2019 (Summa cum laude)

20) THE TIME-COURSE OF SEMANTIC AMBIGUITY: BEHAVIOURAL AND ELECTROENCEPHALOGRAPHIC INVESTIGATION

a. Supervisor: Blair Armstrong
b. PhD student: Joyse Vitorino de Medeiros
c. Defended in 2019 (Summa cum laude)

21) SUBJECT-VERB AGREEMENT IN REAL TIME: ACTIVE FEATURE MAINTENANCE AS SYNTACTIC PREDICTION

a. Supervisors: Simona Mancini & Nicola Molinaro
b. PhD student: Bojana Ristic
c. Defended in 2020 (Summa cum laude)

22) THE ROLE OF INFANT-DIRECTED SPEECH IN LANGUAGE DEVELOPMENT IN INFANTS WITH HEARING LOSS

a. Supervisors: Marina Kalashnikova (principal), Denis Burnham, Pelle Soderstrom, & Yatin Mahajan
b. PhD student: Irena Lovcevic
c. Awarded in 2020 (No grading system)

23) THE BRAIN SIGNATURE FOR READING IN HIGH-SKILLED DEAF ADULTS: BEHAVIORAL AND ELECTROPHYSIOLOGICAL EVIDENCE

a. Supervisors: Brendan Costello & Manuel Carreiras
b. PhD student: Patricia Alves Dias
c. Defended in 2020 (Summa cum laude)

**24) SENSITIVITY TO LETTER SEQUENCES IN WORD PROCESSING AND WORD LEARNING**

a. Supervisors: Jon Andoni Duñabeitia & Angela de Bruin
b. PhD student: María Borragan
c. Defended in 2020 (Excellent)

25) THE RELATIONSHIP BETWEEN CONTEXT AND CONCEPTUAL ACCESS

a. Supervisors: Eiling Yee & Pedro M. Paz-Alonso
b. PhD student: Peter J. Boddy
c. Defended in 2020 (Summa cum laude)

26) INFLUENCE OF EARLY BILINGUAL EXPOSURE IN THE DEVELOPING HUMAN BRAIN

a. Supervisors: Cesar Caballero & Monika Molnar
b. PhD student: Borja Blanco
c. Defended in 2020 (Summa cum laude)
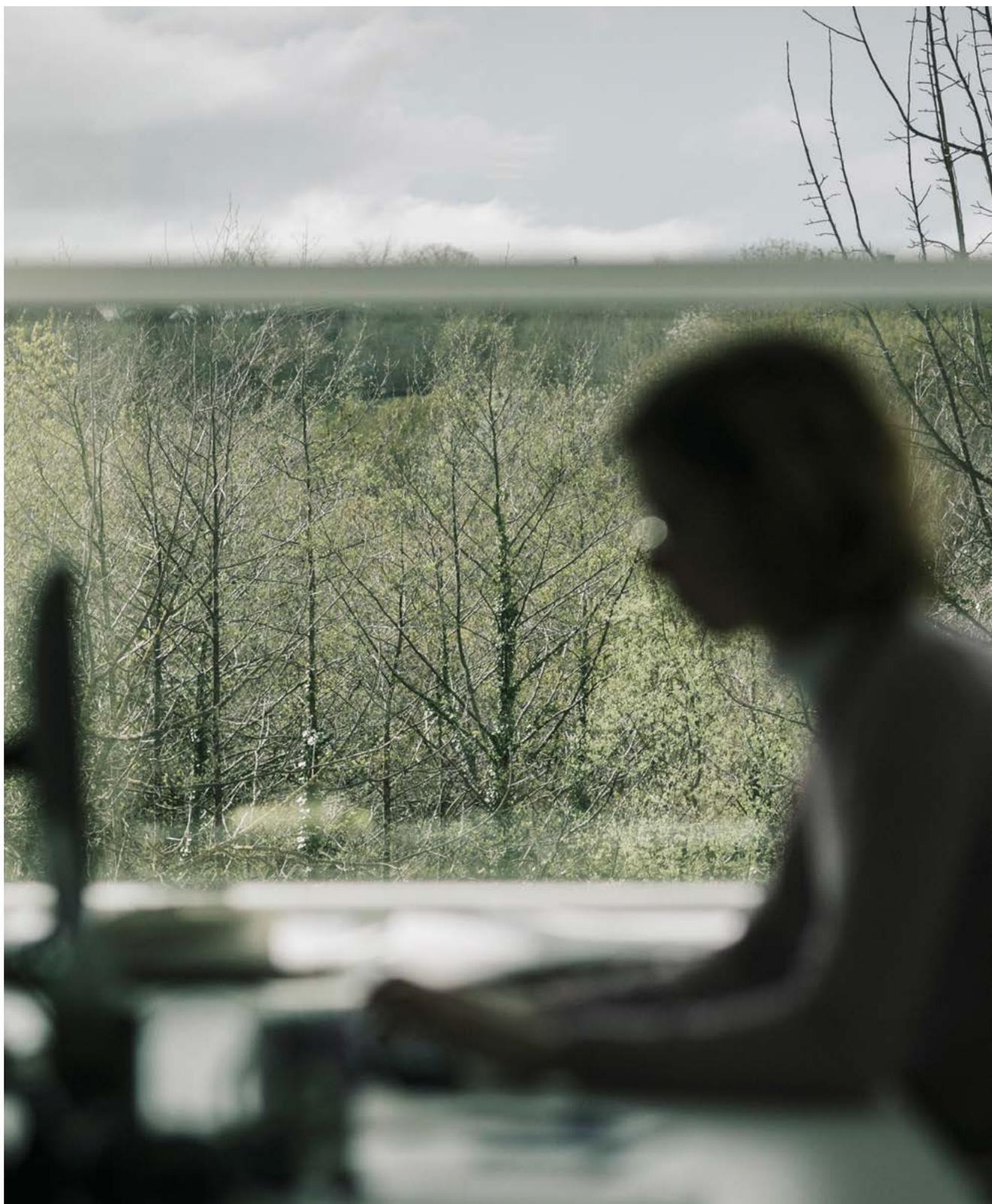
7.C.1 TALENT ATTRACTION

In 2016, the board of trustees of the BCBL endorsed the "European Charter & Code for Researchers" and the European Commission's HRS4R strategy. In January 2017, the BCBL was granted the "HR Excellence in Research" award. Additionally, in 2016 the BCBL put its Gender Action Plan in place. This plan facilitates a flexible environment in which both men and women can combine family time and research. The objective is to create a workplace where the best talent can flourish, in line with the Strategic Vision of the European Research Area.

Access to BCBL positions and promotion is based purely on academic merit. We adhere to an Open, Transparent and Merit based recruitment policy (OTM-R), guaranteeing equal opportunities for all candidates. The BCBL has been actively recruiting, promoting, and retaining talent with both internally and externally funded fellowships through several calls, in line with our commitment to recruit the most outstanding personnel in order to become an international benchmark center in the field.

7.C.2 TALENT RETENTION

Researchers at any stage of their career, regardless of their contractual situation, are given an opportunity for developing professionally improving their employability through accessing a Personal Career Development Plan, which includes (1) Training through personalized research projects under senior supervision, (2) Exchanging knowledge with the scientific community and the general public,

(3) Network-wide training in theory and methods, (4) Complementary training courses, (5) Involvement in proposal writing, task coordination and (6) Development of skills for the organization of training and scientific events.

Finally, we have designed a welcome plan for every researcher who comes to BCBL for the first time. It includes explanations and a thorough description of the city, local administration, introduction to all new colleagues, and assistance to find accommodation. Each newcomer also receives the employee handbook, which includes all aspects of the BCBL organization, such as the mission, vision and values, legal structure, International Scientific Advisory Board (ISAB), research lines, platforms and techniques, internal organization, procedures, key policies, confidentiality and data protection, rules for participation in conferences and research trips, IT procedures, purchasing conditions, health care, tax system, education system, nearby universities, and general information about the city and surrounding area. Every new employee receives support to get their residence and work permit right from origin until arriving in San Sebastian; once here, we help each of them, and when necessary also their family members, to finalize the visa process, bank account opening, and all paperwork related to social security, health card, and GP allocation. Furthermore, most of the researchers coming from abroad are hosted at the Talent House, a residence for researchers coordinated by the Donostia Town Hall, with which the BCBL has a permanent agreement.

HR EXCELLENCE IN RESEARCH
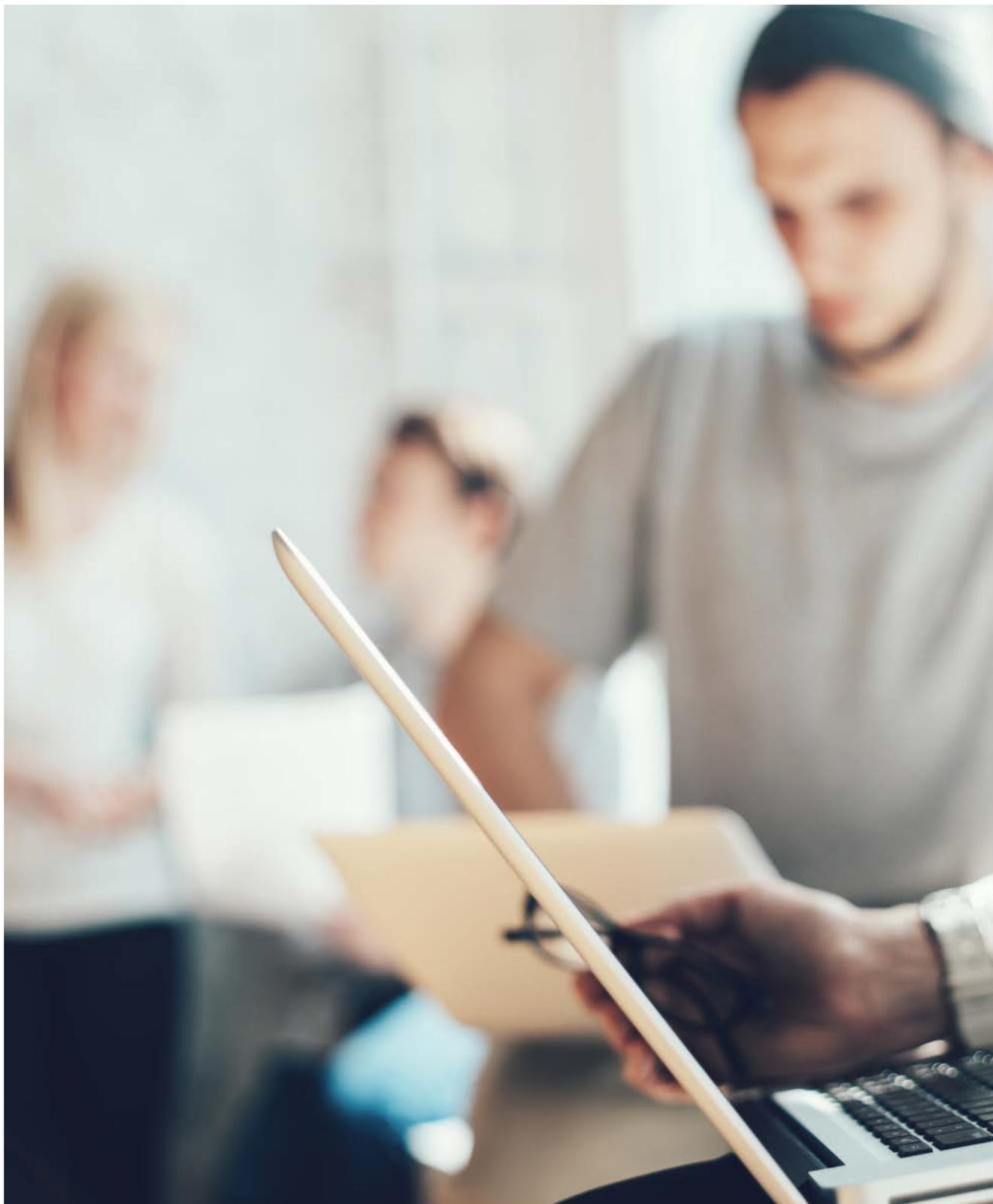
8.A NEURE
8.B OTHER INITIATIVES

08

TECHNOLOGY TRANSFER

8.A NEURE

During the 2017-2020 period, the BCBL also focused on technology transfer to society. In addition to carrying out basic research, intended to increase knowledge, we also ensured this knowledge could be transformed into products and services.

A. Neure Clinic

The clinic's aim is to translate knowledge of basic cognitive processes into socially relevant applications. The clinic focuses on developmental language disorders (developmental dyslexia and specific language impairment) and breakdown due to brain pathology (tumors and stroke). Neure Clinic has developed a unique evaluation battery for Basque and Spanish language skills for use with monolingual and bilingual children who struggle with language and reading acquisition. Neure Clinic also carries out the neuropsychological evaluation of patients with brain tumors (to complement the neuroimaging screening these patients undergo before surgery) and evaluates patients that suffer from aphasia and related language impairments. The clinic has created assessment protocols that combine the administration of behavioral neuropsychological tools and neuroimaging measures to provide a rich set of data for more comprehensive diagnoses and tailored responses to language deficits. The diagnoses provided by Neure Clinic are unique because the assessment batteries were designed through a close collaboration between practitioners (neuropsychologists as well as speech and language therapists) and BCBL researchers with extensive expertise in the field of language disorders.

www.neure.eu

B. Neuresoft

Computerized tools for Dyslexia, SLI and Dyscalculia diagnosis

Our software tools allow for early diagnosis and treatment of learning disorders with multimedia support and have already been tested in a large sample. Once standardized, these advanced diagnostic tools will be distributed through the appropriate marketing channels. The software will automate the diagnostic process, ensure successful interaction with children, and quickly evaluate results against a growing, aggregated database. This will allow us to continuously improve diagnostic sensitivity while expanding the BCBL's research database. Each tool is based on convergent evidence from multiple studies and methods and designed to be user-friendly, interactive and recreation-oriented. Diagnostic accuracy has been quantified by state-of-the-art psychometric testing. Online support is available for all products.

www.neuresoft.eu
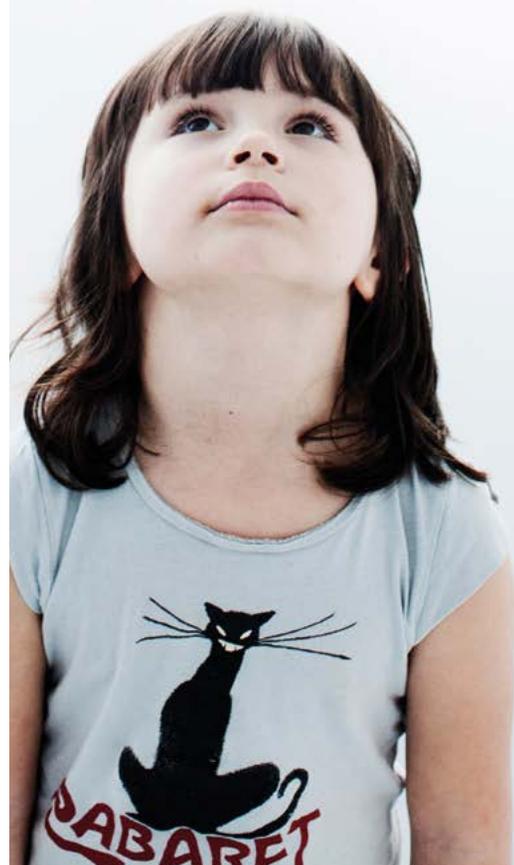
A. Magnetic resonance methods for cognitive neuroscience

We published (1) a tool that automatically segments the hippocampus along its longitudinal axis in lieu of the manual operations typically carried out to correct in-scanner head position; (2) a probabilistic atlas of the human thalamic nuclei built combining ex vivo brain MRI scans and histological data, as well as an application of this atlas to in vivo MRI segmentation; (3) a 3D convolutional neural network that retrospectively estimates head motion in structural brain MRI. This tool is especially useful for collecting MRI with special populations; (4) a tool for boundary artifacts and bias field corrections for high-resolution ex vivo MRI slab acquisitions using Bayesian methods; (5) a new data analysis algorithm based on the physiological model of the multi-echo fMRI signal that enables researchers to map brain responses in space and time without the need for prior information about when and where neuronal activity occurs. All tools and codes have been made publicly available.

B. Computerized screening tool for Aphasia

We have undertaken the development of Aphasia screening batteries in Basque and Spanish, with the goal of bridging clinical and cognitive neuroscience perspectives in the assessment of language impairment. This tool focuses on language comprehension and production using a variety of tasks that have been extensively used in both psycholinguistic and cognitive neuroscience of language research, and have proved highly reliable for assessing the integrity of expressive and receptive linguistic functions.

C. Multimap

Multilingual picture naming test for mapping eloquent areas during awake surgeries

In an ongoing collaboration with the neurosurgery department of the Hospital Cruces in Bilbao, the BCBL is carrying out both presurgical and postsurgical mapping of language in patients that undergo brain surgery at the Hospital Cruces facilities, and additionally providing support for language mapping during the surgical operation. We work closely with the managing bodies of the hospital, the neurosurgeons, and Osakidetza (Basque Public Healthcare) to ensure better postoperative outcomes for the patient. Thanks to our advanced neuroimaging equipment, testing protocols and expertise, we are able to make an immediate translational impact on surgery outcomes while also conducting basic research on how the brain changes after surgery (e.g., neural plasticity). Picture naming tasks are currently the gold standard for identifying and preserving language-related areas during awake brain surgery. We developed MULTIMAP, a multilingual picture naming test for mapping eloquent areas during awake brain surgery. It consists of a database of 218 standardized color pictures for testing in Spanish, Basque, Catalan, Italian, French, English, German, Mandarin Chinese, and Arabic. The MULTIMAP test provides an open-source, standardized set of up-to-date pictures, where relevant linguistic variables across several languages have been taken into account in picture creation and selection.

D. Open Access Databases

The BCBL has developed several databases that can be freely accessed by the worldwide scientific community (www.bcbl.eu/es/investigacion/knowledge-and-tech-transfer/bases-datos)

- Chronset: Roux, F., Armstrong, B.C., & Carreiras, M. (2017). *Chronset: An automated tool for detecting speech onset. Behavior Research Methods (online publication). Doi:10.3758/s13428-016-0830-1*

- LSE-Sign:Gutierrez, E., Costello, B., Baus, C. & Carreiras, M. (2016). *LSE-Sign: A Lexical Database for Spanish Sign Language. Behavior Research Methods, 48:950–962. Doi:10.3758/s134*

- Armstrong, B. C., Zugarramurdi, C., Alvaro, C., Valle Lisboa, J., & Plaut, D. C. (2016). *Relative meaning frequencies for 578 homonyms in two Spanish dialects: A cross-linguistic extension of the English eDom norms. Behavior Research Methods, 48:950–962. DOI: 10.3758/s13428-015-0639-3*

- Multipic, *A standardized set of 750 drawings with norms for six European languages.*

- MultiMap: *Multilingual picture naming test for mapping eloquent areas during awake surgeries.*

E. Presurgical

A promising new research avenue is our presurgical mapping of patients with brain tumors and epileptic foci in areas related to language functions. We will strengthen our successful collaboration with neurosurgeons from the Hospital Cruces in Bilbao, where we have carried out presurgical mappings with advanced neuroimaging tools, assisted neurosurgeons with brain stimulation during operations, and conducted postsurgical control mappings, using special tasks we have developed to map language functions. We have developed a software tool to assess patients' speech production abilities and a battery to evaluate object and action naming capacity in several languages (Spanish, Basque, English, French, Italian, Arabic, and Chinese). The battery will be made freely available through a website; we have signed an agreement with the French company Happyneuron (a subsidiary of SBT Group) to commercialize a premium version of this battery.
In sum, our program will contribute to excellence in education and health delivery and to strategies for positive societal change. Our center will help to advance knowledge and research methodologies in the Cognitive Neuroscience of Language and translate the results of fundamental research into products and services (e.g., software, protocols) to benefit society in collaboration with other responsible agents. The added value of BCBL's knowledge transfer can contribute to meeting the societal challenges specified by Horizon 2020/Horizon Europe. In particular, we will contribute to breakthrough solutions in at least two of the general objectives established for research in the social sciences and humanities: "Health, demographic change and well-being" and "Europe in a changing world - inclusive, innovative and reflective societies".

9.A ORIGIN AND EXPENSE DISTRIBUTION
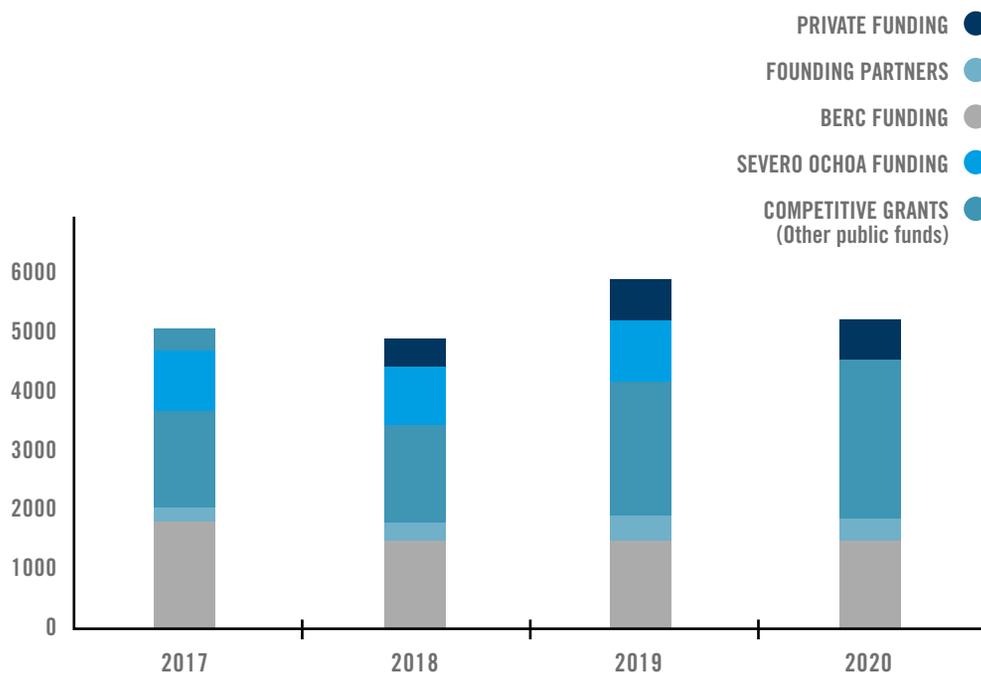
09

FUNDING

9 FUNDING

9.A ORIGIN AND EXPENSE DISTRIBUTION

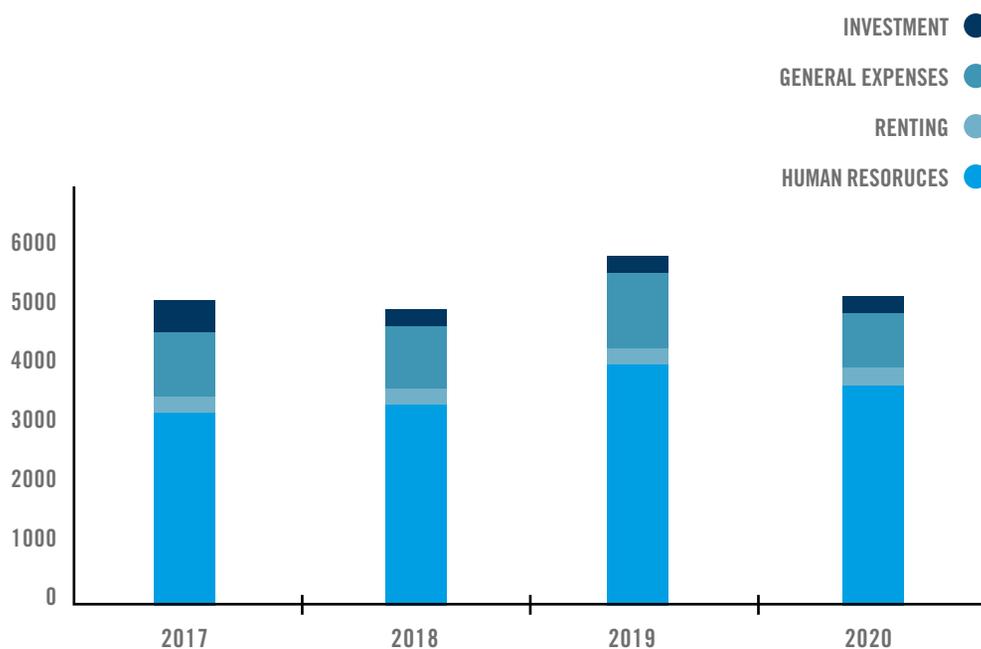Due to their significance, two of the financing programs are highlighted below:

1. The BCBL was created in the framework of the BERC initiative (Basque Excellence Research Center). This initiative provides the BCBL with funding base.

2. The "Severo Ochoa" program has been supporting the BCBL's activity, with a total amount of €4 million for the 2016-2019 period.

Additionally, the BCBL has received competitive financial support derived from research projects (see section 4_ Projects), which accounts for a larger percentage of the total annual budget every tax year.

FUNDING DISTRIBUTION PER YEAR 2017 - 2020

PRIVATE FUNDING ●
FOUNDING PARTNERS ●
BERC FUNDING ●
SEVERO OCHOA FUNDING ●
COMPETITIVE GRANTS ●
(Other public funds)

EXPENSE DISTRIBUTION

INVESTMENT ●
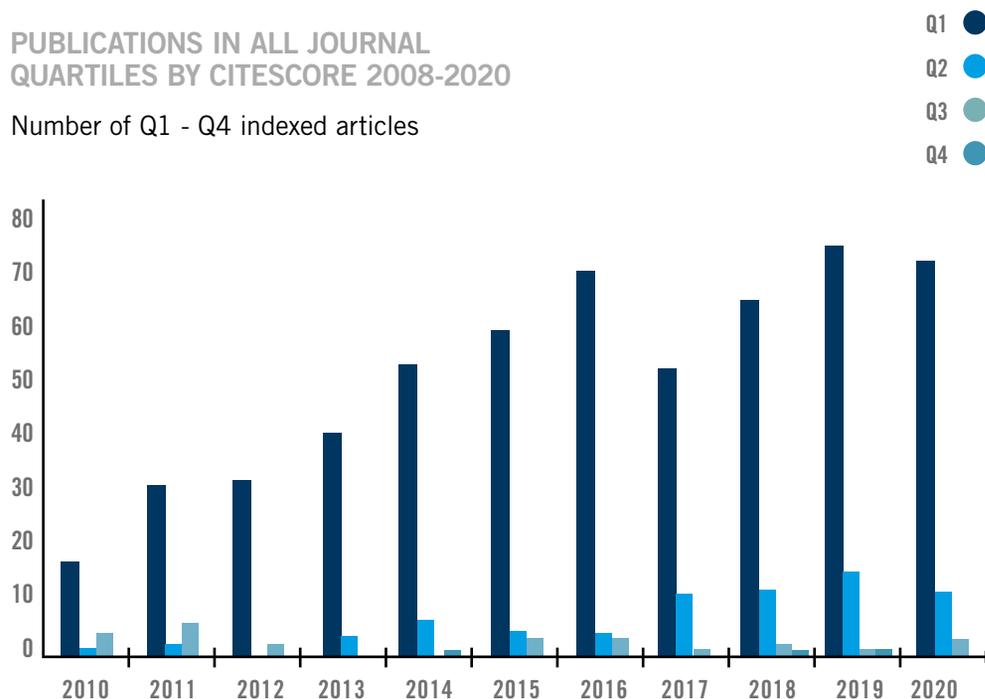GENERAL EXPENSES ●
RENTING ●
HUMAN RESORUCES ●

10

SUMMARY OF PERFORMANCE AND INDICATORS

10.A CHARTS 2010-2020

The charts below show the evolution
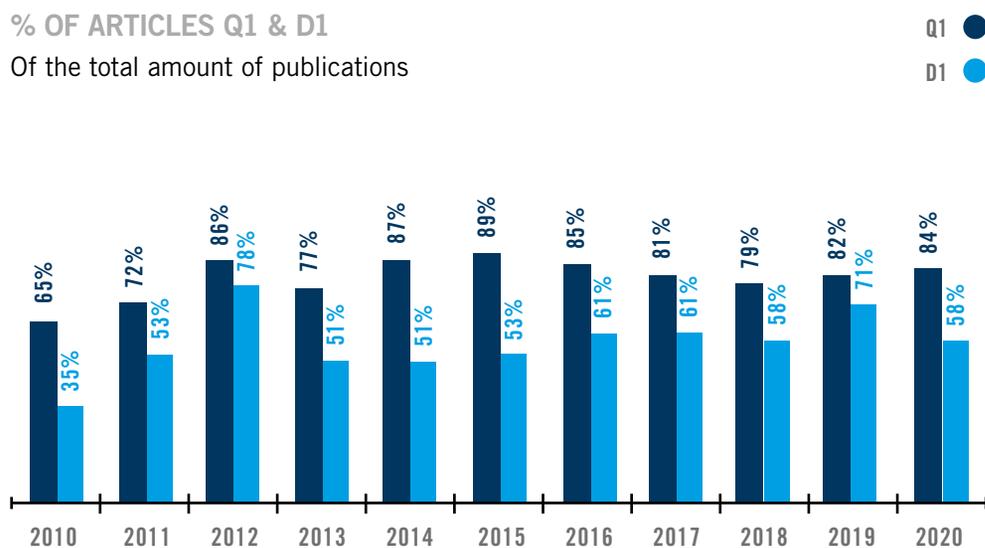of the key indicators since the BCBL's
inception:

PUBLICATIONS IN ALL JOURNAL QUARTILES BY CITESCORE 2008-2020
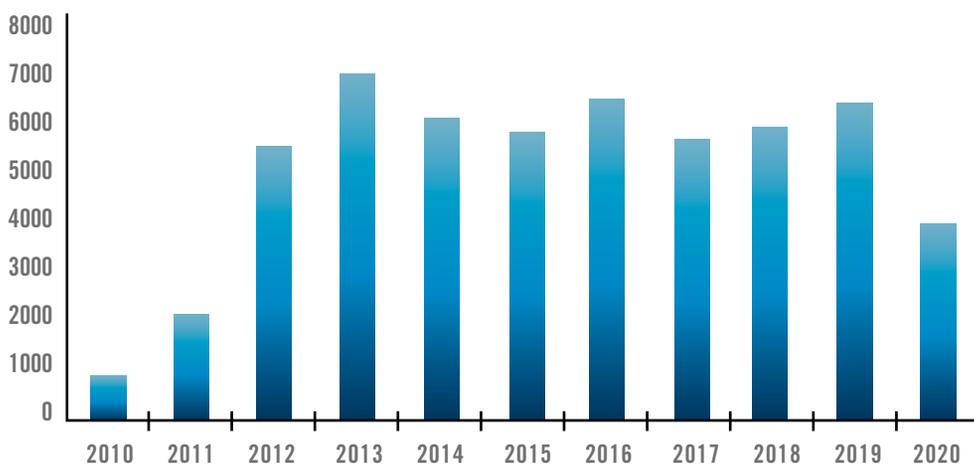
Number of Q1 - Q4 indexed articles

Q1 ●
Q2 ●
Q3 ●
Q4 ●

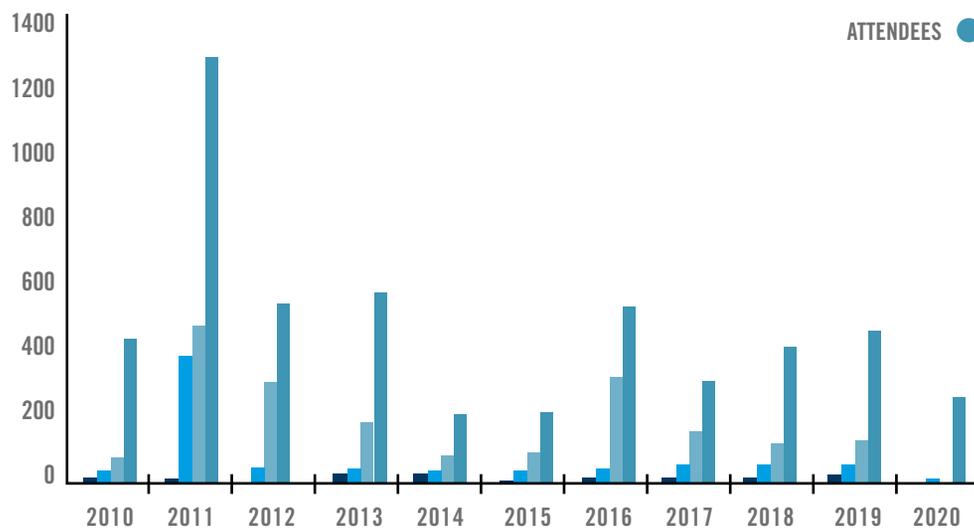
% OF ARTICLES Q1 & D1

Of the total amount of publications

Q1 ●
D1 ●

**NUMBER OF
PARTICIPANTS**

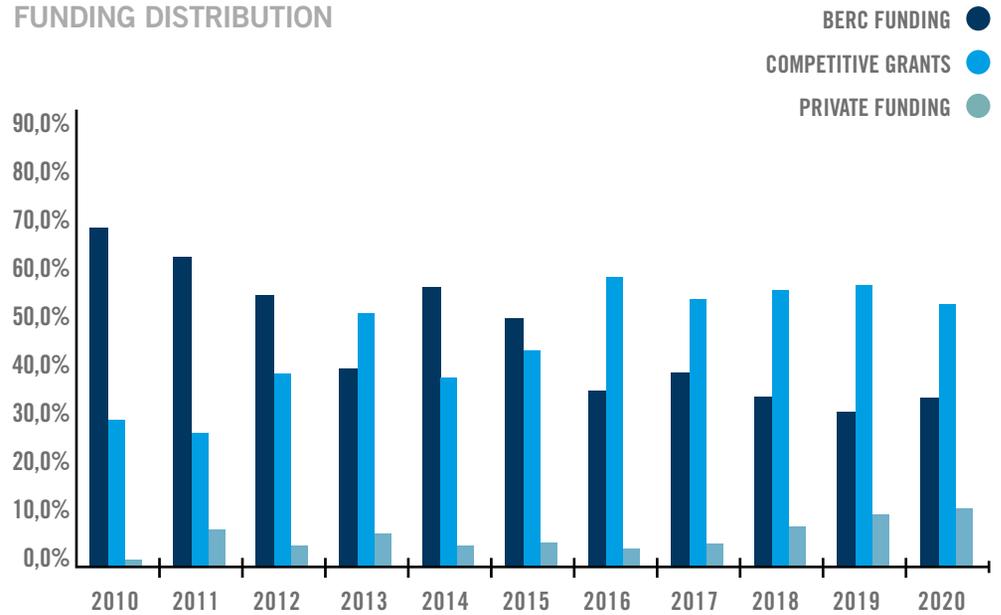**CONFERENCES
ORGANIZED BY BCBL**

KEYNOTE PRESENTATIONS ●
ORAL PRESENTATIONS ●
POSTERS ●
ATTENDEES ●

FUNDING DISTRIBUTION

BERC FUNDING ●
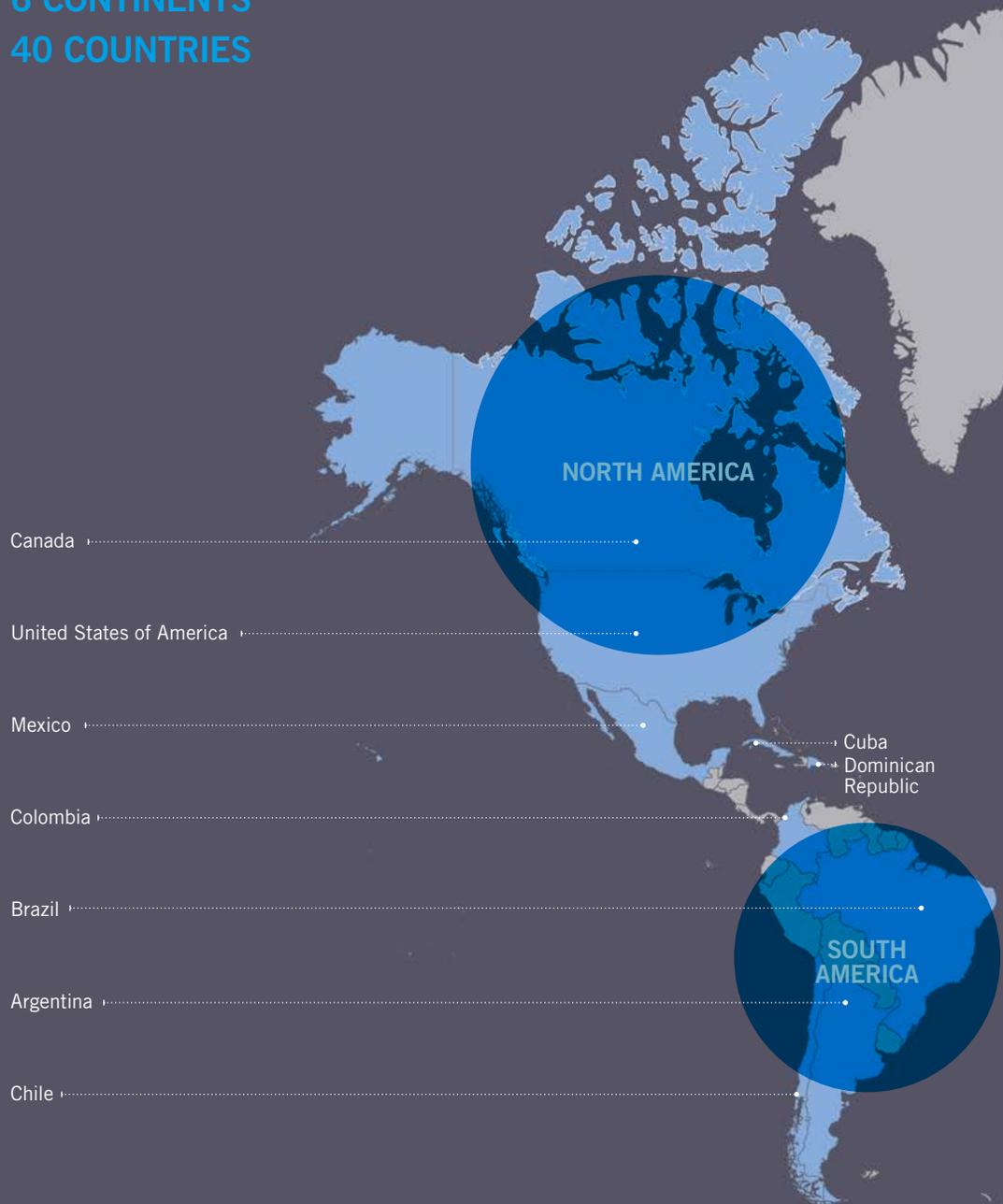COMPETITIVE GRANTS ●
PRIVATE FUNDING ●

TOTAL MEDIA APPEARANCES
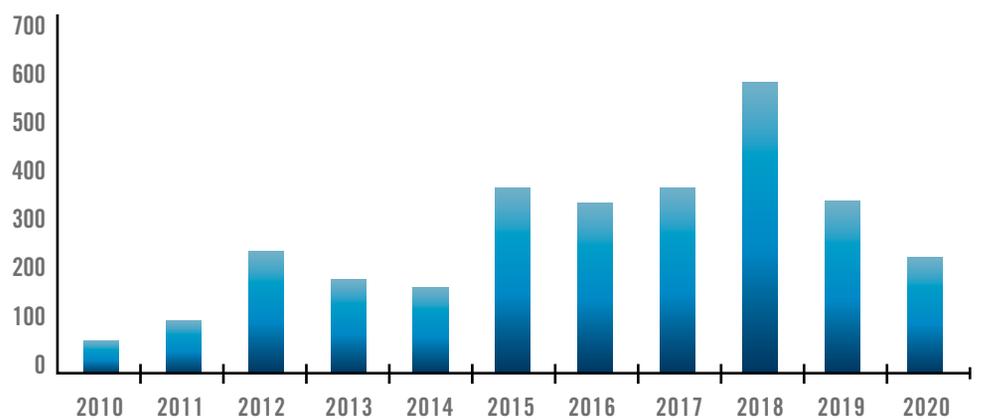
6 CONTINENTS
40 COUNTRIES

NORTH AMERICA

SOUTH AMERICA

Canada

United States of America

Mexico

Cuba
Dominican Republic

Colombia

Brazil

Argentina

Chile

WORLD MAP SHOWING
COUNTRIES WITH WHICH
BCBL HAS RESEARCH
LINKS IN BLUE

Germany

Sweden

Swiss

Slovakia

Holland

Hungary

Belgium

Greece

France

Findland

UK

Turkey

Spain

Russia
(Russian Federation)

Iceland

EUROPE

AFRICA

ASIA

Taiwan

Japan

Pakistan

OCEANÍA

Iran
Islamic
Republic

India

Portugal

China

Morocco

Qatar

Italy

Latvia

Singapore

Australia

Lithuania

Republic of Serbia

Albania

26 **Supervised and defended theses**

52 **H-index**

326 **Papers published**

81% **Of articles in Q1**

62% **Of articles in D1**

131 **Invited talks**

112 **Oral presentations**

HR EXCELLENCE IN RESEARCH
Renewed in 2019

108 Individual fellowships

37 Externally-funded projects

EXCELENCIA SEVERO OCHOA
2016-2019

+22.000
Participations in our experiments

More than 100 children diagnosed since neureclinic's opening in october 2018

12 International conferences organized with 1415 attendees

73%
External funding

18%
Private funding

2017
2020

www.bcbl.eu

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20009 Donostia · San Sebastián, Spain
Tel: +34 943 309 300

ikerbasque
Basque Foundation for Science

innobasque

Gipuzkoako
Foru Aldundia
Berrikuntzako, Landa Garapeneko
eta Turismoko Departamentua

eman ta zabal zazu

Universidad
del País Vasco

Euskal Herriko
Unibertsitatea

Promoted by:

EUSKO JAURLARITZA
GOBIERNO VASCO

BASQUE GOVERNMENT
Department of Education,
Universities and Research

Accredited as:

EXCELENCIA
SEVERO
OCHOA
2016-2019

hr

HR EXCELLENCE IN RESEARCH