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## AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2020

### Turno de acceso general

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**Área Temática:** Ciencias de la educación  
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#### Título:

Building the bridge between neuroscience and education

#### Resumen de la Memoria:

My research focuses on the behavioral and neural effects of language acquisition in children and adults. My overall aim is to use both neuroscience as a tool for improving education, and education as a tool for furthering our understanding of the brain. On the one hand, advances in non-invasive brain imaging technologies are opening a new window into the mechanisms that underlie learning. My research offers the basis to develop personalized intervention programs that are tailored to learners' unique pattern of brain maturation. On the other hand, educational interventions provide a powerful tool for understanding how experiential factors shape brain mechanisms.

My research work at Stanford University (USA) and at the Basque Center on Cognition, Brain and Language (BCBL, Spain) follows two main directions: (1) defining the neural basis of reading acquisition, and (2) determining the critical experiential factors of language learning. The first research line focuses on understanding how the brain's reading circuitry develops in response to education and what variables contribute to maximizing the brain changes supporting accurate reading performances. The second research focuses on the experiential factors that facilitate a successful attainment of second language acquisition, making the processing of a nonnative language more native-like.

My future research plans are aimed at testing the effectiveness of different first and second language training programs at the behavioral and neural level. This knowledge will allow us to define scientifically-based education programs, which are aimed at boosting brain changes underlying language acquisition.

I independently lead and supervise multiple research projects -which have been nationally and internationally funded- using several techniques and experimental populations. I disseminate my research outcomes through peer-reviewed publications, teaching courses and outreach activities. My research is built on national (BCBL) and international (Stanford University) collaborations with research institutions, social and educational services. This makes my work extremely interdisciplinary, building a bridge between neuroscience and education.

#### Resumen del Currículum Vitae:

I got my Phd in Neuroscience in 2013 from the University of Modena and Reggio Emilia (Italy). I have been supervised by Prof. Cristina Cacciari, with whom I worked on a project on language comprehension funded by the Italian Ministry (PRIN grant and Young Researcher Award). During my PhD, I spent one year and half at the University of La Laguna (Tenerife, Spain) being supervised by Prof. Horacio Barber. Here, I worked on reading comprehension, collaborating with Dr. Niels Janssen and Dr. Markus Conrad. During my PhD I refined my technical and experimental skills participating to the Marie Curie Network-Language, Gender and Cognition (ITN LCG grant). Thanks to this network, I could collaborate with international researchers such as Dr. Anna Siyanova (Victoria University of Wellington), Prof. Francesco Vespignani (University of Trento), Dr. Eve Fabre (Superior Institute of Aeronautics). I could also create fruitful collaborations with healthcare institutions (Fondazione Maugeri) to study new approaches of cognitive rehabilitation for reading disorders.

In 2013 I started my post-doc at the Basque Center on Cognition, Brain and Language (Spain) where I collaborated with Dr. Clara Martin, Dr. Nicola Molinaro, Dr. Simona Mancini, Dr. Doug Davidson and Prof. Manuel Carreiras. I worked as a collaborator on an European grant focused on reading acquisition (ERC grant), and I got funding from the Basque government and the Spanish Ministry to work on second language learning (Basque government grant and Plan Nacional grant, where I am co-PI) and language training programs (Juan de la Cierva grant).

I currently have a double appointment as a Researcher at Stanford University and as a Staff Scientist at the BCBL, coordinating a multi-lab project on a reading acquisition (Marie Curie Global fellowship). I collaborate with international research institutions (University College London, Toronto University), educational and clinical services (primary schools, Neure clinic).

My research focuses on the behavioral and neural effects of language acquisition in children and adults. My overall aim is to draw a connection between neuroscience and education in order to propose evidence-based language training programs.



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I supervise one PhD student (BCBL), eight Master students (BCBL), and one undergraduate student (University of Trento, Italy). I am a lecture in the Master program on Cognitive Neuroscience of Language (University of the Basque Country), where I teach "Sentence and discourse processing" and "Quantitative Methods".

I am a member of the Italian National Agency for Research Quality Evaluation, and I was part of the scientific committee of the AMLAP conference (2016). Since 2013 I have been involved in the evaluation process of many international conferences (CUNY, ESCOP, Neurobiology of Language) and I am Editor of Frontiers in Psychology and a co-Editor of a Cortex Special Issue. I have been invited to deliver 14 talks at international conferences. I am a member of scientific societies (ESCOMP, AIP, CNS). I actively disseminates my research outcomes to the

general public through TV, newspapers and radio interviews (TeleDonosti, rtve, Radio Onda Vasca, EITB, Radio Euskadi).

Since 2011, I published 26 research articles, 18 as first author and 3 as last author. During my career, I visited several labs and developed research collaborations with researchers from other international institutions.



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### Turno de acceso general

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#### Título:

Indagación científica y formación inicial de profesorado

#### Resumen de la Memoria:

Dr García-Ruiz has a dilated background as a chemical researcher, as a result of her first PhD in Chemistry and a post-doctoral period at the University of Bristol. In the last years, she decided to introduce a turning point in her scientific career and enrolled herself in the field of Science Education. Thus, since 2020 she is conducting post-doctoral research in Science Education at the University of Málaga, focusing on the inquiry-based science education and the pre-service science teachers (PSST), as a way to promote scientific literacy and responsible citizenship in Secondary Education. She has analysed the relationships between PSST beliefs and the processes of inquiry, also paying attention to the perceptions about context-based learning and the emotional profile derived. To improve the PSST professional development, she has designed and performed a training proposal to integrate the development of scientific inquiry practices into the treatment of daily life problems. She has also analysed the impact of this training programme on the teachers' beliefs about inquiry, their ability to design research projects, and put it into practice, evaluating the relevance that PSST give to their IBSE training. Several publications and conference contributions have emerged from this research, whose results are still being investigated. In parallel, the researcher collaborates within the IndagaSTEM Escuela project, an educational cooperation agreement between the Junta de Andalucía and the University of Malaga. The project, dedicated to developing critical thinking through scientific projects with inquiry and context-based learning approaches in schools, is being carried out with Primary Education Teachers, opening the door to a possible extension to Secondary Education, in which proposals for inquiry made by PSST would be accommodated.

Also, during this short time, she has established a MARCO Agreement of collaboration with the University of Playa Ancha (ref. 8.07 / 5.12.5574). Within this project, the INCE Network arises, dedicated to promoting IBSE between Chile and Spain, and from which exchange seminars have begun between teachers and students from both countries. Currently, at the Universities of Playa Ancha and the Metropolitana, the training program is being implemented, so that over the next few months she will be able to establish a comparative study between the different educational systems.

She has also started a second research line on inquiry teachers identity. Having gained some experience in the study and analysis of teachers perceptions about IBSE, and after getting to know the main difficulties pre-service teachers encounter about their future practice, as well as the lack of relationship they establish with their background, she considers the next step would be to deepen in the identity process.

#### Resumen del Currículum Vitae:

Dr Cristina García-Ruiz has been committed to scientific research ever since her early university years. After graduating with a First Class Honour BSc degree and completing an MSc in Advanced Chemistry, she obtained one of the most competitive doctoral scholarship (FPU programme) from the Government of Spain and started her PhD studies in the research group of Prof. F. Sarabia, at the University of Málaga. Her work in Organic Chemistry focused on the stereoselective synthesis of epoxides and diepoxides using a novel type of cyclic sulfur ylides and its application towards the total synthesis of natural products and analogues of biological interest for the pharmacy industry. During her predoctoral years, she was awarded several grants for congress attendance and was also the finalist in the XII Lilly Research Awards for PhD Students, granted by Lilly Spain. Gratifyingly these studies also rendered her with the Esteve Award for Young Researchers, granted by the Spanish Society of Medicinal Chemistry (SEQT) in 2015. She got her PhD (Suma Cum Laude) from the University of Málaga in December 2014.

In 2013, she was a visiting student at the University of Cambridge, under the supervision of Prof. S. V. Ley and Dr D. L. Browne. This short-stay provided her in 2016 with a publication related to the synthesis of trifluoromethylated isoxazoles. Also in 2015, she obtained a Postdoctoral Fellowship from the Ramón Areces Foundation to initiate her postdoctoral career at the prestigious group of Prof. V. K. Aggarwal, at the University of Bristol, where she has been developing new methodologies of synthesis. Her early postdoctoral studies provided her with three publications; one of them related with a stereospecific allylic functionalization by reactions of allyl boronate complexes and the other two, with the stereo divergent olefination of enantioenriched boronic esters. In 2017, after having gained a significant background in organic synthesis and methodology, as well as in medicinal chemistry, with significant contributions in JCR publications (Q1 and Q2 papers) and international conferences, she decided to expand her professional career, redirecting it into Science Education research. Thus, she completed the MEd in Teaching Training at the University of Málaga and enrolled herself in a second PhD focused on the Inquiry-based Science Education (IBSE), under the supervision of Prof. Ángel Blanco and Dr Teresa Lupión. Gratefully, in 2020 she earned a Postdoctoral Research Contract at the Science Education Department, where she has been working into pre-service



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teaching training and IBSE. During this short period, she has already made some contributions to scientific publications indexed in Latindex, co-authoring some book chapters and presenting her early educational results in some of the most relevant international conferences, such as ESERA, where she also was awarded for the participation at the Virtual Doctoral Network, in summer 2020. She now wishes to continue pursuing her professional career in Science Education as an independent researcher at the University of Málaga, where she could apply all the acquired knowledge and expertise.



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#### Título:

Multidisciplinary approach to the digitalisation of educational systems

#### Resumen de la Memoria:

Mi trayectoria como investigador se ha centrado en el estudio de las tecnologías digitales en los sistemas de educación combinando ciencias de la educación y ciencias sociales. Esta línea de investigación se puede dividir en dos partes. Por un lado, el análisis de la creciente digitalización de los sistemas de educación formal. Por otro lado, el análisis del uso de estas tecnologías para aprendizaje permanente. Ambas partes están orientadas a hacer unos sistemas educativos más innovadores y eficientes.

Con respecto a la digitalización de los sistemas de educación formal, he realizado estudios en educación obligatoria y en educación superior, tanto en España como en Europa. En las diversas publicaciones he cubierto este aspecto de una manera sistémica incluyendo temas como: a) la incorporación y uso de las tecnologías digitales por los centros educativos (de primaria, secundaria y educación superior) en diferentes áreas y con diferentes propósitos pedagógicos y organizativos; b) el estudio y desarrollo de instrumentos de autoevaluación y diagnóstico para los centros educativos con la finalidad de mejorar su capacidad digital (ver proyecto SELFIE); c) la implantación y adecuación de la educación abierta en los sistemas educativos europeos; d) el impacto de diferentes usos pedagógicos de la tecnología en el rendimiento académico de los estudiantes universitarios y, e) el abandono de la educación superior online.

Con respecto al uso de las tecnologías digitales para el aprendizaje a lo largo de la vida, también he realizado diversos estudios a nivel nacional y europeo. En esta parte, he cubierto temas como: a) la aportación y uso de los MOOCs y las redes online al desarrollo profesional continuo de los/as profesores/as; b) los retornos socio-económicos de la participación en educación superior online y en MOOCs como medio de formación permanente; y c) el análisis del uso y diseño de las tecnologías digitales para ofrecer oportunidades de aprendizaje adaptadas a las necesidades de poblaciones específicas como son los refugiados e inmigrantes.

En muchos casos, las aportaciones constituyen un análisis temprano de temas emergentes mediante aplicación de métodos multidisciplinares poco utilizados tradicionalmente en el análisis de la digitalización de los sistemas educativos. Además, en la muchos los casos mi investigación ha tenido un componente internacional estudiando diversos países europeos y colaborando/publicando con investigadores de diferentes centros de investigación y/o nacionalidades.

En el futuro, espero seguir desarrollando esta línea de investigación. Dada la importancia creciente de la digitalización de la educación, incluyendo en los planes de recuperación post-COVID, se puede esperar que la línea de investigación tenga un alto impacto social. En particular, me gustaría contribuir a la comprensión de los mecanismos más eficientes para digitalizar los sistemas y centros educativos, consiguiendo en paralelo un mejor aprovechamiento de las oportunidades derivadas de la digitalización y una minimización de sus riesgos (ej. deterioro pedagógico, aumento de desigualdades educativas, riesgos para la privacidad etc.). Además, también me gustaría seguir analizando el papel de las tecnologías digitales como forma innovadora para responder a la creciente necesidad de aprendizaje a lo largo de la vida de las sociedades occidentales.

#### Resumen del Currículum Vitae:

De mi currículum, destacaría lo siguiente:

1. Perfil multidisciplinar. Aunque mi formación inicial es en ciencias políticas, he trabajado durante 14 años como investigador en educación combinando disciplinas. Mis proyectos y publicaciones reflejan este perfil multidisciplinar ya que vinculan la digitalización de los sistemas educativos a temas relacionados con ciencias de la educación (usos pedagógicos de las tecnologías digitales, competencia digital, digitalización de los centros educativos, formación del profesorado) y ciencias sociales (brecha digital, mercado laboral, democratización de la educación, integración). Mi tesis doctoral fue una aproximación multidisciplinar a la interacción online en cursos universitarios y fue dirigida por un catedrático en pedagogía y una experta en análisis de datos. Los datos de la tesis vienen de un proyecto que estudia la sociedad de la información dirigido por un catedrático en sociología. En el JRC (centro de investigación de la Comisión Europea) he combinado investigación educativa con una aproximación desde las ciencias sociales. Mis publicaciones han sido en revistas de ciencias de la educación (ej. Computers & Education, British Journal of Educational Technology, Educational Technology Research and Development, Higher Education).



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2. Internacionalización. En 2012 hice una estancia postdoctoral de 2 meses en la universidad de Stanford. El mismo año me incorporé al JRC, donde durante 8 años he participado en la elaboración de calls, evaluación de propuestas y la implementación de proyectos a nivel europeo, incluyendo su gestión y coordinación. Entre otros: coordinar la investigación de la herramienta SELFIE usada por más de 8600 centros educativos y 850.000 individuos de 63 países, liderar el proyecto MOOCknowledge donde se recogió y analizó información de 23.000 participantes en 84 MOOCS internacionales o liderar un proyecto de análisis de recursos educativos digitales para refugiados. Ello me ha permitido establecer una red de contactos con investigadores y centros de investigación internacionales.

3. Combinación de investigación académica y orientada a políticas. Además de mi trayectoria como investigador académico, desde mi incorporación al JRC he desarrollado una trayectoria paralela de investigador aplicado y orientado a políticas educativas. He elaborado numerosos informes y estudios sobre educación digital que han sido utilizados por la Comisión Europea, DG EAC, DG EMPL y otras instituciones europeas y nacionales. He presentado mi trabajo en foros internacionales (con representantes europeos y de los ministerios de educación) y, a nivel nacional a representantes autonómicos y ministeriales (INTEF, INEE, Red.es). Algunos documentos políticos relevantes a los que he contribuido son: Digital Education Action Plans (2018-2020 y 2021-2027) y Education and training Monitor.

4. Historial de publicaciones. He publicado 13 artículos en revistas indexadas en JCR, 3 de ellos en revistas Q1 (además de varios artículos en revistas no indexadas), 5 artículos en otras revistas, 2 capítulos de libro, 4 informes science for policy del JRC con impacto político directo, 11 informes técnicos como autor y 2 informes como editor/coordinador. También he publicado 8 artículos en conferencias internacionales y contribuido a 3 libros. Mis publicaciones tienen sobre 1000 citas según Google Scholar.