INTERLEARN

European Industrial Doctorate funding for Early Stage Researchers

Background to the studentships: This year, over 5 million European infants will be born into an intellectually demanding and technologically sophisticated world. These children's success in learning academic, linguistic, and social skills will play a large part in determining their future health, wealth, and happiness - and in driving European social and economic success. Thanks to new technologies, we have an unprecedented opportunity to individually tailor the learning process on a massive scale. The importance of a personalised learning approach is highlighted by recent research showing that individual children's and ultimately adults' abilities across various domains are strongly influenced by neural, genetic, environmental, educational, cognitive, and socioemotional drivers that interact over development. However, we have a very limited understanding of how, when, and why these factors might affect any given child's learning trajectory - and above all, how that child will respond to an intervention or novel challenge to learning. The INTERLEARN European Industrial Doctorate programme will train a cohort of five early stage researchers who can lead a new European-wide initiative to deliver technologically advanced and scientifically rigorous individualised learning paradigms. Each of the interlocking research projects in INTERLEARN takes a theoretically and neuroscientifically grounded, developmental, and multimethodological approach to uncover how and when to manipulate a child's learning environment to maximise her or his potential, and to design and implement tools to deliver these learning manipulations.

What we expect from you: We expect applicants to possess a degree in a relevant area (neuroscience, psychological science, computer science, biology) or equivalent experience. In general, you should have experience in working with neuroimaging data or other complex datasets, strong skills with programming tools such as Matlab, have excellent written and spoken English skills, or the willingness to acquire these skills, and the ability to work in a team. Experience in developmental cognitive neuroscience and research especially with children or infants is desirable. Further, you should be able, after training, to build an independent career in the field of developmental research. **ESRs will be required to live in London and spend 50% of their time at CBCD, Birkbeck, University of London and live in the Industrial Beneficiary or Partner country for 50% of their time.** Note that there may be particular degree, language, and experience requirements for a given ESR; these are noted in the specifications for each position.

What we can offer: The **ESRs will be registered into the PhD programme at Birkbeck, Univeristy of London** and will be working at institutes with an excellent track record and facilities for research into developmental neuroscience, intervention research and neurocognitive research. Thanks to the integration of basic sciences and industrial practice, these projects offer a unique opportunity for combining a strong theoretical approach with clinical, educational, or practical applications. The ESRs will be embedded in an active and social group of junior and senior researchers and PhD students with expertise across development. The ESRs will be mentored by world-leading researchers throughout their project, including strengthening their independent research skills, in the writing of scientific articles, and in their future career progression. The INTERLEARN network also offers a unique programme of training in specialised and generalisable skills on topics such as project management, academic and communication skills, advanced analysis techniques in neuroimaging, typical and atypical brain development, entrepreneurship, product innovation, translation, career development, and clinical diagnostics.

Recruitment Requirements: Because of the requirements of Marie Sklodowksa-Curie positions, Early Stage Researcher (ESR) candidates must not have resided or carried out their main activity (work, studies, etc.) in the country of recruitment for more than 12 months in the 3 years immediately before the recruitment date. **For ESRs 1&2, the country of recruitment is Germany; for ESRs 3-5 the country of recruitment is Great Britain.**

Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account. The ESR shall, at the time of recruitment by the host organisation, be in the first four years (full-time equivalent research experience) of their research career and have not been awarded a doctoral degree.

Salary:	Salary will be a minimum of €30868 per annum for ESRs 3,4,5 (ESR 1&2 salary to be announced shortly) and will depend on the circumstances of the candidate (i.e. whether the candidate has a family, whether they join the pension scheme and the country of recruitment).
Duration of post:	Fixed term 3-year contract for ESRs 3, 4 and 5 at Birkbeck, and for ESRs 1 and 2 there will be two consecutive 18 month contracts, the first from P&G and the next from Birkbeck.
Hours:	Full-time, hours will be in accordance with employing institution

Closing date:	Posts will remain open until all are filled with suitable candidates.
Interview date:	To be arranged
Start date:	By September, 2017

Interested? Please send your CV and any initial inquiries to Petra Rozkova (p.rozkova@mail.bbk.ac.uk).

Note that for ESR 1&2, the recruiting institution and employer for the first 18 months will be Procter & Gamble Service GmbH, Germany, ESRs will then have an 18 month contract at Birkbeck, University of London. For ESR 3-5, the recruiting and employing institution will be Birkbeck, University of London, UK.

Before enquiring note that for ESR 1-2, if you have lived in Germany for longer than 12 months in the last 3 years you are not eligible to apply for this post. The same applies for ESR 3-5 if you have lived in the United Kingdom for longer than 12 months in the last 3 years.

Essential skills for all five posts (please see additional project-specific skills listed with each project)

Attributes	Essential	Method of Assessment
Knowledge	- A keen interest in developmental cognitive neuroscience - Possess sufficient breadth or depth of specialist knowledge in the discipline and of research methods and techniques	*Interview Application Presentation References*
General Skills/ Attributes	- Excellent written and spoken English skills - Excellent interpersonal skills with an ability to communicate effectively orally and in writing to scientists a well as parents and their children - Strong organisational and administration skills - Ability to work proactively - Leadership skills - A commitment to working with diversity - Computer proficiency in standard software - Good data analysis skills and familiarity with a variety of statistical methods and packages - Ability to write up complex research findings and to convey specialist/technical material - Willingness to undergo police check, (required for working with children)	*Interview Application References*
Qualifications	A top-class Bachelors or Masters level qualification in a related discipline (e.g., Neuroscience, Behavioural Neuroscience, Cognitive Science, Developmental Sciences, Psychology, Biomedical and Natural Sciences)	*Application*

ESR 1: Supervising Partners are Procter & Gamble and CBCD, Birkbeck, University of London. ESRs will be registered for a 3 year PhD at Birkbeck University of London and will spend the first 18 months at Procter & Gamble and second 18 months at CBCD.

The role of sleep in early cognitive development. Sleep plays a critical role in early cognitive development, but we know little about the mechanisms that mediate these effects, or how to promote effective sleep in early development. This project combines the expertise of Procter & Gamble in understanding early sleep and how it can be optimised through product design, and the expertise of the Centre for Brain and Cognitive Development in using multimodal behavioural, cognitive and neural methods to understand early brain development. The student will spend the first part of the PhD working at Procter & Gamble's Innovation Centre in Germany. During this phase, the student will conduct a large longitudinal study of sleep in young infants in the first year of life. This will include low-intensity methods such as actigraphy and questionnaires to measure day and night time sleep, and measures of socio-emotional and cognitive development. Data from this phase will be used to determine which sleep profiles are associated with positive versus negative cognitive development, taking into account potentially confounding factors. This information will be used to guide generation of hypotheses and selection of target groups in the second phase. The second phase will take place at the Centre for Brain and Cognitive Development in the UK. In this phase, the student will generate and test hypotheses about the mechanisms underpinning the role of sleep in cognitive development. For example, the student might use neuroimaging methods (like NIRS and EEG) to examine functional connectivity and brain activity during sleep, and how that relates to learning in good and poor sleepers. The student might test whether better sleepers use executive functioning skills (e.g. frontal connectivity) to self-soothe after arousals; which features of brain activity during sleep predict better learning post-nap; and/or how effects of sleep in development are mediated through effects on parent-child interaction. The student may also test the effects of brief interventions on sleep quality. Taken together, this project will produce fundamental new knowledge of the role of sleep in early development.

Additional essential and desirable skills for ESR1.

ESSENTIAL SKILLS: a) Good statistical skills (e.g. advanced/Masters-level stat training); **b)** Strong aptitude for programming experiments/analysis in programs such as R, STATA, M-Plus and/or Matlab; **c)** Good oral German skills, or aptitude and willingness to develop them before the contract starts; **d)** Experience in working with neuroimaging data and/or complex datasets;

DESIRABLE SKILLS: a) Relevant knowledge of sleep and/of early cognitive development in infancy; **b)** Skills in acquiring and analysing eye tracking, ERP/EEG, MRI, or NIRS data; Experience in working with infants (in private or professional context).

ESR 2: Supervising Partners are Procter & Gamble and CBCD, Birkbeck, University of London. ESRs will be registered for a 3 year PhD at Birkbeck University of London and will spend the first 18 months at Procter & Gamble and second 18 months at CBCD.

How touch mediates infant happiness and learning. Touch is one of the earliest senses through which infants learn about their physical and social environment; it continues to serve these functions throughout life. Its importance in early development is highlighted by studies showing positive long-term effects of skin-to-skin or massage touch during the neonatal period on cognitive and emotional development 10 years later. However, unlike learning through vision and hearing, whose mechanisms are heavily studied, the mechanisms through which touch affects learning remain largely unexplored. This research project combines P&G's longstanding interest in understanding infant and child skin physiology and parent and child well-being with the CBCD's expertise in using multimodal behavioural, cognitive and neural methods to understand early brain development. This project will test the hypothesis that learning occurs in optimal states of arousal and affect and that one way by which touch promotes learning is by modulating child's arousal and affective states. The student will spend the first half of the PhD at P&G, carrying out observational and questionnaire studies to understand the what type of touch is most commonly used in parent child interaction and whether touch is use to regulate particular infant states. The ESR will build on this work to develop experimental studies investigating the effects of different types of tactile stimulation (e.g. stroking, massaging, touch with different materials) have on infants' arousal, affective states and learning. These studies will be carried out at P&G and CBCD, in the second half of the PhD. Measures of arousal (e.g., heart rate, skin conductance, EEG, hormone levels), behavioural affective responses (e.g. smiling), brain function (e.g., NIRS, EEG) and learning will be taken while or after the child experiences tactile stimulation.

Additional essential and desirable skills for ESR2.

ESSENTIAL SKILLS: a) Good statistical skills (e.g. advanced/Masters-level stat training); **b)** Experience in working with neuroimaging data and/or complex datasets; **c)** Good oral German skills, or aptitude and willingness to develop them before the contract starts.

DESIRABLE: a) Relevant knowledge of early cognitive and brain development; **b)** Experience with acquiring and analysing eyetracking, ERP/EEG, MRI, or NIRS data; **c)** Experience in working with infants (in private or professional context).

ESR3: Supervising Partners are RIST and CBCD, Birkbeck, University of London. ESRs will be registered for a 3 year PhD at Birkbeck University of London and will spend the 18 months at CBCD and 18 months at RIST.

The neural dynamics of motivated learning. Educators have long known that children learn better when they are motivated and attentive. However, despite substantial effort and creativity driving the design of teaching tools, they rarely succeed with every child, and at every instance of learning. At the moment, we have at best a fragmentary understanding of how motivation and attention change as learning unfolds, how this depends on developmental stage, and what type of interventions best succeed at increasing motivation for learning. This project builds on findings that particular electrophysiological markers such as low frequency cortical-subcortical loops (measured by EEG) or pupil dilation reflect information seeking, and predict subsequent learning success. It also builds on the Romanian Institute of Science and Technology's (RIST) expertise in advanced data analysis methods that can enable estimation of brain oscillations in various frequency bands and reveal neural information transfer between different brain regions. The project will use neuroimaging methods (EEG, eye tracking) and state-of-the-art data analysis to unveil the underlying moment-to-moment dynamics of information seeking, how they relate to learning and are modulated by external rewards. For this purpose, the ESR will use and develop cutting-edge analytical methods based on transfer entropy, scaled correlation, oscillation score, cross-frequency coupling, coherence and phase-locking. The ESR will take advantage of existing data sets collected in infants, children and adults with typical and atypical development (e.g. ADHD risk) at CBCD and RIST. These findings will advance our understanding of the neural mechanisms of motivated learning while also providing important pointers for increasing learning success. Furthermore, the project will act both as a testbed and improvement platform for the tools and analysis software at RIST, and will help develop valuable new methods to investigate the processes associated with learning in the brain. The ESR will spend time at RIST developing advanced data analysis methods and applying them to existing/new neurophysiological datasets as well at the CBCD, developing paradigms and carrying out imaging studies with developmental populations.

Additional essential and desirable skills for ESR3.

ESSENTIAL SKILLS: a) Programming skills **b)** Experience with programs such as R, STATA, M-Plus and/or Matlab; **c)** Familiarity with signal processing concepts and tools; **d)** Experience in working with neuroimaging data and/or complex datasets.

DESIRABLE SKILLS: a) Knowledge of signal processing: sampling, Fourier analysis, coherence, phase-locking, causality measures, cross-correlation analysis etc; **b)** Programming in Matlab; **c)** Experience with EEG data recording and analysis.

ESR 4: Supervising Partners are Oefenweb and CBCD, Birkbeck, University of London. ESRs will be registered for a 3 year PhD at Birkbeck University of London and will spend the 18 months at CBCD and 18 months at Oefenweb.

Tailoring the learning experience to individual students. To succeed in school, children must not only be motivated to learn, but must also be able to learn quickly from instruction and feedback. Personalisation of all phases of the learning process requires detailed analyses of the individual learning as it takes place in an individual. Many learning systems nowadays adapt exercises and instruction to the general ability level of the student. There are two important extensions to this approach. One step is to adapt exercises and instruction to individual differences in students' learning (e.g. ability to learn from negative feedback, confidence, motivation). A second step is it to adapt feedback and instruction to the task-specific strategies used, and types or errors made by children. Online learning systems allow, in principle, advanced data-analysis of strategies and errors. Experimental (neuro-) psychological methods (e.g., with eye-tracking) will be used to validate and extend these data-analytic approaches.

The project will investigate new ways to personalise instruction and feedback for learning in children. Specifically, the project will investigate how individual differences (e.g., executive function skills, personality characteristics, learning attitudes) impact on the learning cycle, and will address questions on how better to tailor the learning environment based on task-specific error and strategy analysis.

The project will develop novel approaches to personalised learning in children in collaboration with Amsterdam-based company Oefenweb, making use of their over 100,000 active participants within and outside schools. Students' learning characteristics will be accessed using questionnaires. While at the CBCD, the student will develop and test paradigms that can measure learning in primary-school children, using a variety of experimental methods. Advanced statistical methods will also be applied to interpret these 'big data'. In parallel studies, big data from the online learning environment will be paired with age-appropriate experimental measurements of learning and engagement (e.g. eye tracking, heart rate monitoring, and change in pupil dilation).

Additional essential and desirable skills for ESR4.

ESSENTIAL SKILLS: a) Data analytic skills, such as time series analysis, multiple regression, SEM; **b)** Strong aptitude for analysis in programs such as R, STATA, M-Plus and/or Matlab; **c)** Excellent interpersonal skills with an ability to communicate effectively orally and in writing to scientists a well as lay-persons and children; **d)** Strong organisation and administration skills;

e) Willingness to undergo police checks required for working with children (country-specific); **f)** Experience in working with developmental data or other complex datasets.

DESIRABLE SKILLS: a) Relevant knowledge of cognitive development and educational science; **b)** Further data analytic skills, such as network analysis and item response theory; **c)** Programming experience with R, javascript, PhP, html, Matlab; **d)** proficiency in spoken Dutch, or willingness to learn before the contract starts.

ESR 5: Supervising Partners are RID & IWAL and CBCD, Birkbeck, University of London. ESRs will be registered for a 3 year PhD at Birkbeck University of London and will spend the 12 months at CBCD and 24 months at RID & IWAL.

Representational change in intensive language intervention. Many otherwise typically developing children have severe difficulties in learning to read. To help remedy these reading problems, specialised institutions for dyslexia health care in the Netherlands (RID and IWAL) have designed and implemented research-driven, intensive intervention programmes. These interventions lead to significant improvements in reading, but there is still considerable variability in outcomes. Understanding individual differences in the neurocognitive processes underlying this variability is crucial for tailoring dyslexia treatment to each individual. This project investigates how interindividual differences in the learning trajectory and intervention outcome relate to changes in each individual's neural representations. This project combines the strengths of IWAL & RID's large-scale behavioural interventions with developmental neuroimaging (EEG/fMRI) and analytic innovations from IWAL/RID and CBCD-affiliated researchers.

Additional essential and desirable skills for ESR5.

ESSENTIAL SKILLS: a) A keen interest in developmental cognitive neuroscience and/or reading, auditory, and dyslexia research; **b)** Sufficient breadth and depth of specialist knowledge in the field of developmental cognitive neuroscience; **c)** Aptitude for analysis in programs such as R, STATA, M-Plus and/or Matlab; **d)** Excellent interpersonal skills with an ability to communicate effectively orally and in writing to scientists a well as lay-persons and children; **e)** Strong organisation and administration skills; **f)** Effective oral and written communication skills, to write up complex research findings and to convey specialist/technical material; **g)** Experience in working with developmental neuroimaging data or other complex datasets.

DESIRABLE SKILLS: a) Relevant knowledge of cognitive development and educational science; **b)** EEG or fMRI experience; **c)** proficiency in spoken Dutch, or willingness to learn before the contract starts.

WORK ENVIRONMENT

CBCD: The Centre for Brain and Cognitive Development (CBCD), Birkbeck, University of London has a long and excellent track record in postgraduate training, twice being designated by the EU a Marie Curie Training Centre of Excellence in 2006 and 2010. It was also awarded the Queen's Anniversary Prize for Higher Education in 2006. At the 2014 REF, Birkbeck was rated as being in the top 5 Psychology, Psychiatry and Neuroscience departments in the UK. The CBCD was formed in 1998 and has a strong international reputation for its work in developmental cognitive neuroscience. The CBCD is housed in a purpose-designed building that contains extensive laboratory space with state-of-the-art ERP (x 2), NIRS optical imaging, eye tracking (x 3), EMG/GSR, motion capture and behavioural testing facilities. The CBCD also has close ties with the Birkbeck/UCL Centre for NeuroImaging (BUCNI), which is a research-dedicated MRI facility that specialises in developmental MRI, and is located only a few doors away from the CBCD. For more information, see www.cbcd.bbk.ac.uk and bucni.psychol.ucl.ac.uk.

P&G: At Procter & Gamble's (P&G) Innovation Centre in Schwalbach, near Frankfurt/Main, Germany, over 500 scientists and engineers conduct research in natural, material, engineering and life sciences. The centre includes a clinical lab and a consumer research centre visited weekly by over 1000 families with infants for testing. ESRs based at P&G will become part of the P&G global R&D network with connections to over 5000 scientists and engineers based in North and South America, Asia and Europe. P&G was founded 1873 in Cincinnati/Ohio, USA as a manufacturer of candles and soaps. Today P&G develops or manufactures products in over 70 countries and sells 65 consumer product brands including Pampers, Ariel, Oral-B, Vicks or Pantene to 5 billion consumers in over 180 countries. For more information: www.pg.com

Oefenweb: Oefenweb.nl (Math Garden) is a Netherlands-based company, with its headquarters in Amsterdam, focused on progress-monitoring software for mathematical and executive function skills in school-aged children. This is accomplished in an online gaming environment, using an adaptive system, which provides virtual incentives, making users responsible for their own learning progress. Math Garden provides detailed information about the performance of its users, at both an individual and group level, allowing comparison with up-to-date reference groups, tracking of improvement in performance over time, insight into strengths, trouble spots and typical mistakes. Oefenweb currently has over 100,000 active participants, within and outside of schools, across the Netherlands. For more information: https://www.oefenweb.nl/

Romanian Institute of Science and Technology (RIST): RIST was founded in 2009 as a non-profit private research institution and is focused on theoretical, computational and experimental neuroscience, neuro-robotics, the study of complex systems and chaos, and machine learning. Its researchers explore the brain by means of experimentally recorded data from humans (using EEG), and through computer simulations of realistic models of cortical microcircuits. In addition, RIST is developing new, non-conventional techniques for neural data analysis and visualisation. RIST/Coneural was the host of the only Max Planck Partner Group in Romania, and is a partner in one of the largest H2020 projects on systems biology, with a total budget of over €5.7 Million and 12 participating partners. For more information: http://rist.ro/?L=1

Regionaal Instituut voor Dyslexie (RID): The RID is a Dutch-based company, with 13 main locations and 70 care-locations throughout the Netherlands and its headquarters in Arnhem. The RID was founded in 1989 and is one of the largest specialised institutes for dyslexia in the Netherlands, The RID provides research-based diagnostic assessment and treatment of developmental dyslexia, dyscalculia and related learning problems. Over 1700 children with severe reading and/or arithmetic problems are treated yearly. The RID puts a strong focus on research, innovation and development, and closely collaborates with Maastricht University on fundamental research on reading development and dyslexia. In addition there is close collaboration with RIOzorg, an institute with 20 locations where children and adolescents with signs of ADHD, behavioral problems, autism, anxiety, trauma, compulsions, tics are treated. For more information: https://www.rid.nl/.

Iwal Instituten Voor Dyslexie (IWAL): IWAL was incorporated in 1983 and is a major specialised institution in the Netherlands for clinical care to children with learning disabilities with a dedicated research and development department. IWAL has over 30 years of experience with scientifically-driven health care for people with learning disabilities, especially for children with reading or mathematics disabilities. Over 1000 children with learning disabilities are referred to IWAL for clinical care on a yearly basis. IWAL participates together with the Psychology Department of the University of Amsterdam in the Rudolf Berlin Center. This is a university centre in which clinical care, (post)doctoral education, and neurocognitive and behavioural research in the area of learning disabilities are integrated. For more information: http://www.iwal.nl/