Clara A. MOREAU

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Born December 9, 1991, in Paris, France
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Personal website: claramoreau9.github.io
Language: French (native), English (fluent)

Educational experience

Jan 2021 - current. Postdoctoral researcher, Human Genetics and Cognitive Functions unit
Advisor: Thomas Bourgeron - Pasteur Institute, University of Paris, France.

July 2020 - Dec 2020 Postdoctoral researcher, Neurosciences, University of Montreal, Canada
Advisor: Pierre Bellec - SIMEXP, CR-IUGM, University of Montreal.

2015 - 2020 Ph.D. in Neurosciences, University of Montreal, Canada. Ranked as '*Exceptional thesis'*
Advisors: Sébastien Jacquemont (Geneticist, Sainte Justine Hospital) and Pierre Bellec (Computer Science Department, SIMEXP lab, CR-IUGM, University of Montreal)
Mapping genome-wide neuropsychiatric mutation effects on functional brain connectivity: Copy number variants delineate dimensions contributing to autism and schizophrenia

2019 Internship - Imaging Genetic Center, USC, USA
Advisor: P.M. Thompson
Skills: DTI analyses (ENIGMA consortium) - Cross-CNVs

2014-2015 Research Assistant, Medical Genetics Department, CHUV, Switzerland
Advisor: S. Jacquemont
Skills: MRI Protocol development and Scanning, Analyses (R, Matlab), Website development for family recruitment, neuropsychological assessment.

2012 - 2014 Master degree in Cognitive Sciences (DEC, Cogmaster)
Ecole Normale Supérieure & Descartes University, Paris, France

2013 - 2014 Internship - Neurospin Institute, CEA, France
Advisors: Marion Noulhiane & Lucie Hertz-Pannier (UNIACT)
Skills: fMRI analysis (SPM, Matlab) - Neurodevelopmental cohort, memory tasks.

2013 Internship - Neuroscience department, University of Montreal, Canada
Advisor: Pr. P. Jolicoeur; Skills: MEG/EEG analyses for an auditory task.

2012-2013 Internship - Necker Children Hospital, INSERM – UMR 663 Paris, France
Advisors: Pr. M. Noulhiane and Dr C. Chiron
Skills: Neuropsychological assessment and data analyses - Memory & Synesthesia

2012 Internship - Centre de Recherche en Neurosciences de Lyon
Advisors: Pr. N. Ravel and Pr. R. Gervais, Lyon, France
Skills: Recording olfactory cells in mice (electrophysiology) and signal processing

2009-2012 BSc degree in Neuropsychology; Descartes University, Paris-V France

2006-2009 Scientific Baccalaureate; Victor Duruy High School, Paris 75007 France

Summer school attendance and workshop

08.2017: Deep Learning - Summer school at the University of Montreal (MILA), Canada
06.2017: Workshop Brainhack - University of British Columbia, Canada

08.2016: Brain Imaging Genetics for Imagers, Summer school: Radboud University, Nijmegen
06.2016: Workshop Brainhack (fMRI) - Lausanne, Switzerland
02.2016: Workshop Brainhack (MRI) - Pasteur Institute, FR
04.2015: HackTheBrain workshop (EEG) - London, UK
08.2013: Basic and Advanced functional MRI, Summer school at McGill, Montreal, CA

Teaching experience

2021: Moderator at the OHBM educational courses
05.2021-12.2021: Supervisor L. Dry (Master internship - AgroParisTech)
04.2021-09.2021: Co-supervisor S. P. (BSc–3rd year - Genetics "Magistère", Paris)
2018-2019-2020: Teaching Assistant, Brain Imaging Techniques (100 students, UdeM, Pr. P. Bellec)
07.2020-12.2021: Co-supervisor A. Harvey (Master internship - Informatics, DIRO, UdeM)
06.2019-12.2021: Co-supervisor A. Proulx (Honours degree & Master internship - Psychology)
01.2019-07.2019: Supervisors of G. Dumais (BSc–3rd year, Neurosciences, UdeM)
05.2018-06.2018: Instructor at the Brainhack School 2018 (Imaging genetics, UdeM)
05.2016-08.2016: Supervisors of A. Casgrain-Cyr (BSc–3rd year, Bioinformatics, UdeM)

Peer-reviewing

2021: Agence National de la Recherche (ANR, France) (n=1)
2020: Brain (n=1)
2020: Progress in Neuropsychopharmacology & Biological Psychiatry (n=1)
2020: Molecular Autism (n=1)
2019: Neuroimage (n=2 papers)

Awards

06.2021: Exceptional abstract of the year at the OHBM conference.
06.2020 : PhD ranked as an '*Exceptional thesis*', part of the '*Dean's Honor List*', and nominated for the *best thesis of the university*.

Personal grant and prices

09.2019: RBIQ Grant 15,000 $CAD
08.2018: RBIQ Grant 5,000 $CAD
11.2017: RBIQ Grant 3,000 $CAD
06.2017: OHBM Travel award 500 $USD
06.2016: OHBM Travel award 500 $USD

Computer skills

Programming languages: R, Python, Matlab; Html, JavaScript & CSS (Web development).
Softwares: NIAK (fMRI), SPM12 (VBM, Neuromorphometric), Freesurfer and Civet (Cortical Thickness), FSL (TBSS), EEGlab (EEG)

Science Dissemination

05.2021: Simons Foundation Autism Research Initiative. Q&A with Sébastien Jacquemont and Clara Moreau: Why brain imaging signatures for autism are so elusive

11.2020: Simons Foundation Autism Research Initiative. Gene mutations point to overlaps in brain connectivity for autism, schizophrenia

10.2020 - Internal press release from the CHU Ste Justine Gènes, connectivité cérébrale, et maladies neuropsychiatriques

06.2016: Brain imaging workshop co-organizer (Brainhack) with P. Bellec, Lausanne, Switzerland

2016: In charge of the science dissemination for the "Brain and Development research" section at the Ste Justine Hospital, Montreal

2015-2016: Radio show: "Psychiatric conditions" and "Inside the Brain" (Neuroimaging techniques)

03.2014: Annual Cognitive science forum, Paris, FR Symposium (moderator) Artificial, animal, and human cognitive processes: How could we delineate Intelligence?

11. 2014: EPFL, CH Round table Protecting Ideas, Liberating Innovation, and Open collaboration

2014-2015: "Startup Weekend" workshops organizer and teacher, for Ph.D. students (6 editions: Lausanne (EPFL), and Paris (ENS, CogInnov, and ESPCI)).

2014-2015: Board member and web manager for the national political committee "Science en Marche" (french organization of researchers).

2014: Conference co-organizer at the ENS University of Paris: "Conciliate Open Science, Patents, and Intellectual property issues?"

06.2015: Open innovation "Lift Conference", Shanghai, China

09.2014: University of Lausanne, CH Symposium Open Access, Open Data, and Open Science: reality, and amalgam

03.2013: Co-organizer of the annual french Cognitive sciences Forum (Consciousness process of intelligence across the animal, the human, and the computer)

2013-2015: Secretary of "Hack your Ph.D." association (To promote Open Access of scientific publications) and Open Knowledge Conference, Geneva, Switzerland

2012-2015: Active member of "Cognivence" and « FRESCO » (French Federation of Cognitive Science students)

Invited speaker

International conferences

04.2021: Society of Biological Psychiatry, virtual meeting
Symposium "Brain Alterations and Mechanisms in Carriers of Genomic Structural Variants"

06.2020 Human Brain Mapping, (virtual),
Symposium "Neuropsychiatric genetic variation shapes brain architecture by modulating gene expression"

06.2019 Human Brain Mapping, Rome
Symposium "A tough nut to crack: neurodevelopmental connectopathies." (video online)

05.2019 Society of Biological Psychiatry, Chicago
Symposium "Large Scale Imaging Studies of Rare Copy Number variants: Brain Imaging from Enigma and Other Large-Scale International Studies" (link)

04.2019 International Society for Autism Research, Montreal

Symposium: “Human and Animal Models: Impact of High-Risk Copy Number Variants on Brain Structure, Functional Connectivity, and Sexual Development.” (link)

Local conferences

05.2021: Les enjeux actuels en Neuroeducation (virtual)

Lecture “Que nous ont appris les dernières avancées en neuro-imagerie et génétique sur les troubles du spectre de l'autisme?”

02.2021: Pasteur Institute

Lecture “Atlas of functional connectivity relationships across rare and common genetic variants, traits, and psychiatric conditions”

03.2020: Feindel BIC Lecture McGill University, Canada “Neuropsychiatric mutations delineate functional brain connectivity dimensions contributing to autism and schizophrenia”.

08.2019: Imaging Genetic Center University of South California, USA “High-risk psychiatric mutations modulate functional brain connectivity pointing to dimensions involved in autism and schizophrenia”

05.2016: University of Montreal, Canada

Lecture: “From the first human genome to genome editing”

Posters presented in international conferences (first author only)

Moreau, C. A., Kumar, K., Harvey, A., Huguet, G., Urchs, S., … Jacquemont, S. (2021). *Atlas of functional connectivity relationships across rare and common genetic variants, traits, and psychiatric conditions*. **OHBM 2021**. Selected to be part of "**year’s exceptional abstracts**".

Moreau, CA., Urchs, S., Huguet G., …Bellec, P., Jacquemont, S. . Functional Connectivity Analyses Suggest Shared Molecular Mechanisms Across 12 Neuropsychiatric Mutations, Autism and Schizophrenia. SOBP 2020

Moreau, CA., Urchs, S., Huguet G., …Bellec, P., Jacquemont, S. . Brain-Wide Connectome Analyses Suggest Shared Mechanisms Across Eight High-Risk Neuropsychiatric Mutations. **INS, Denver, CO 2020**

Moreau, CA., *, Urchs, S.*, C. Schramm, …, Simons VIP Consortium, C. Bearden, Bellec, P., Jacquemont, S. Gene dosage alters brain connectivity and delineates functional signatures contributing to autism and schizophrenia. **WCPG Anaheim, CA 2019**

Moreau, CA., *, C. Schramm*, Huguet G., Urchs, S., Kumar K., Douard E., A. Evans, Labbe A., Greenwood C., Chakravarty M., Bellec, P.‡, Jacquemont, S. ‡ Estimating the commonalities of any recurrent CNVs on different anatomical and functional brain metrics. **Human Brain Mapping, Rome 2019**

Moreau, CA., *, Urchs, S.*, C. Schramm, P.O. Quirion, A. Lin, L. Kushan, A. Evans, J.D. Lewis, Simons VIP Consortium, C. Bearden, Bellec, P.‡, Jacquemont, S. ‡ Shared functional connectivity alterations across neurodevelopmental mutations, ASD, ADHD, and schizophrenia. **Enhancing Psychiatric Genetic Testing, and Training in Europe, EnGagE, Paris 2019**

Moreau, CA., *, Urchs, S.*, C. Schramm, P.O. Quirion, A. Lin, L. Kushan, A. Evans, J.D. Lewis, Simons VIP Consortium, C. Bearden, Bellec, P.‡, Jacquemont, S. ‡ Mirror effects of 4 neurodevelopmental CNVs on functional connectivity and implication for idiopathic autism **Sixth Biennial Conference on Brain Connectivity, Montreal 2018**

Moreau, CA., *, Urchs, S.*, …, A. Evans, J. D. Lewis, Bellec, P., Jacquemont, S. . Mirror effects of 4 neurodevelopmental CNVs on functional connectivity and implication for idiopathic autism **World Congress of Psychiatric Genetics, Glasgow 2018**

Moreau, CA., *, Urchs, S.*, …, A. Evans, J. D. Lewis, Bellec, P., Jacquemont, S. . Global functional over-connectivity in 16p11.2 CNV deletion carriers. **Human Brain Mapping, Singapore 2018**

Moreau, CA., *, Urchs, S.*, Simons Variation in Individuals Project Consortium, A. Evans, J. D. Lewis, Bellec, P., Jacquemont, S. . **Altered brain connectivity in patient with 16p11.2. World Congress of Psychiatric Genetics, Orlando 2017**

Moreau, CA., *, Lewis JD., *, Evans A.‡, Jacquemont, S. ‡, and the Simons Variation in Individuals Project Consortium**.** Altered subcortical diffusivity in 16p11.2 CNVs. **Human Brain Mapping, Vancouver 2017**

Lewis JD.*, **Moreau, CA. ***, Martin-Brevet S., …, Jacquemont, S. ‡, A. Evans‡, the 16p11.2 European Consortium, and the Simons VIP Consortium. Thickness and contrast in 16p11.2 CNVs. **Human Brain Mapping, Vancouver 2017**

Under review papers (online preprint)

Moreau, C. A., Kumar, K., Harvey, A., Huguet, G., Urchs, S., Douard, E. A., Schultz, L. M., Sharmarke, H., Jizi, K., Martin, C.-O., Younis, N., Tamer, P., Rolland, T., Martineau, J.-L., Orban, P., Shin, D., Silva, A. I., Hall, J., van den Bree, M. B. M., … Jacquemont, S. (2021). *Atlas of functional connectivity relationships across rare and common genetic variants, traits, and psychiatric conditions*. **medRxiv, under review in Science Translational Medicine**. https://doi.org/10.1101/2021.05.21.21257604

Urchs, S. G. W., Tam, A., Orban, P., **Moreau, C.,** Benhajali, Y., Nguyen, H. D., Evans, A. C., & Bellec, P. (2020). Subtypes of functional connectivity associate robustly with ASD diagnosis. In ***bioRxiv,* under review in eLife** (p. 2020.04.14.040576). https://doi.org/10.1101/2020.04.14.040576

Benhajali, Y., Badhwar, A., Urchs, S., **Moreau, C.,** Chouinard-Decorte, F., Vainik, U., Ferré, P., Orban, P., Pérusse, D., & Bellec, P. (2020). Subtypes of brain activation are heritable and genetically linked with behavior in the Human Connectome Project sample. ***PsyArXiv* under review in Neuroimage** https://doi.org/10.31234/osf.io/excdq

Published papers (n=18)

Modenato, C., Martin-Brevet, S., **Moreau, C.A.**, Rodriguez-Herreros, B., Kumar, K., Draganski, B., Sønderby, I.E., Jacquemont, S. Lessons learned from neuroimaging studies of Copy Number Variants, a systematic review, accepted in ***Biological Psychiatry***

Ecker C., Pretzsch C.M, Bletsch A., Mann C, Schaefer T., Ambrosino S., Tillmann J, Afsheen Yousaf A., Chiocchetti A., Lombard M.V, … **Moreau C.A.,** … the EU-AIMS LEAP Group, Declan G. Murphy. Inter-individual differences in cortical thickness and their genomic underpinnings in autism spectrum disorder. *accepted in* ***The American Journal of Psychiatry***

Modenato, C., Kumar, K., **Moreau, C.A.,** Martin-Brevet, S., Huguet, G., Schramm, C., Martineau, J.-L., Martin, C.-O., Younis, N., Tamer, P., Douard, E. A., Thebault-Dagher, F., Cote, V., Charlebois, A.-R., Deguire, F., Maillard, A. M., Rodriguez-Herreros, B., Pain, A., Richetin, S., … Jacquemont. (2020). Neuropsychiatric copy number variants exert shared effects on human brain structure. *accepted in* ***Translational Psychiatry***

Moreau, C. A., Raznahan, A., Bellec, P., Chakravarty, M., Thompson, P. M., & Jacquemont, S. (2021). Dissecting autism and schizophrenia through neuroimaging genomics. ***Brain***. https://doi.org/10.1093/brain/awab096

Moreau, C. A., Ching, C. R., Kumar, K., Jacquemont, S., & Bearden, C. E. (2021). Structural and functional brain alterations revealed by neuroimaging in CNV carriers. ***Current Opinion in Genetics & Development***, *68*, 88–98. https://doi.org/10.1016/j.gde.2021.03.002

Sønderby, I. E., van der Meer, D., **Moreau, C.,** Kaufmann, T., Walters, G. B., Ellegaard, M., Abdellaoui, A., Ames, D., Amunts, K., Andersson, M., Armstrong, N. J., Bernard, M., Blackburn, N. B., Blangero, J., Boomsma, D. I., Brodaty, H., Brouwer, R. M., Bülow, R., Bøen, R., … ENIGMA-CNV working group. (2021). 1q21.1 distal copy number variants are associated with cerebral and cognitive alterations in humans. ***Translational Psychiatry***, *11*(1), 182. https://doi.org/10.1038/s41398-021-01213-0

Douard, E., Zeribi, A., Schramm, C., Tamer, P., Loum, M. A., Nowak, S., Saci, Z., Lord, M.-P., Rodríguez-Herreros, B., Jean-Louis, M., **Moreau, C.**, Loth, E., Schumann, G., Pausova, Z., Elsabbagh, M., Almasy, L., Glahn, D. C., Bourgeron, T., Labbe, A., … Jacquemont, S. (2021). Effect Sizes of Deletions and Duplications on Autism Risk Across the Genome. ***The American Journal of Psychiatry*****,** *178*(1), 87–98. https://doi.org/10.1176/appi.ajp.2020.19080834

Bannier, E., Barker, G., Borghesani, V., Broeckx, N., Clement, P., Emblem, K. E., Ghosh, S., Glerean, E., Gorgolewski, K. J., Havu, M., Halchenko, Y. O., Herholz, P., Hespel, A., Heunis, S., Hu, Y., Hu, C.-P., Huijser, D., de la Iglesia Vayá, M., Jancalek, R., **Moreau C.A.,** … Zhu, H. (2021). The Open Brain Consent: Informing research participants and obtaining consent to share brain imaging data. ***Human Brain Mapping*****.** https://doi.org/10.1002/hbm.25351

Sønderby, I. E., Ching, C. R. K., Thomopoulos, S. I., van der Meer, D., Sun, D., Villalon-Reina, J. E., Agartz, I., Amunts, K., Arango, C., Armstrong, N. J., Ayesa-Arriola, R., Bakker, G., Bassett, A. S., Boomsma, D. I., Bülow, R., Butcher, N. J., Calhoun, V. D., Caspers, S., Chow, E. W. C., … **Moreau, C.A,** … ENIGMA 22q11.2 Deletion Syndrome Working Group. (2021). Effects of copy number variations on brain structure and risk for psychiatric illness: Large-scale studies from the ENIGMA working groups on CNVs. ***Human Brain Mapping*****.** https://doi.org/10.1002/hbm.25354

Moreau, C. A., Urchs, S. G. W., Kuldeep, K., Orban, P., Schramm, C., Dumas, G., Labbe, A., Huguet, G., Douard, E., Quirion, P.-O., Lin, A., Kushan, L., Grot, S., Luck, D., Mendrek, A., Potvin, S., Stip, E., Bourgeron, T., Evans, A. C., … Jacquemont, S. (2020). Mutations associated

with neuropsychiatric conditions delineate functional brain connectivity dimensions contributing to autism and schizophrenia. ***Nature Communications*****,** *11*(1), 1–12. https://doi.org/10.1038/s41467-020-18997-2

Moreau, C. A., Jean-Louis, M., Blair, R., Markiewicz, C. J., Turner, J. A., Calhoun, V. D., Nichols, T. E., & Pernet, C. R. (2020). The genetics-BIDS extension: Easing the search for genetic data associated with human brain imaging. ***GigaScience***, *9*(10). https://doi.org/10.1093/gigascience/giaa104

Costalat, G., Godin, B., Balmain, B. N., **Moreau, C.,** Brotherton, E., Billaut, F., & Lemaitre, F. (2020). Autonomic regulation of the heart and arrhythmogenesis in trained breath-hold divers. ***European Journal of Sport Science***, 1–19. https://doi.org/10.1080/17461391.2020.1749313

Cárdenas-de-la-Parra, A., Martin-Brevet, S., **Moreau, C.,** Rodriguez-Herreros, B., Fonov, V. S., Maillard, A. M., Zürcher, N. R., 16p11.2 European Consortium, Hadjikhani, N., Beckmann, J. S., Reymond, A., Draganski, B., Jacquemont, S., & Collins, D. L. (2019). Developmental trajectories of neuroanatomical alterations associated with the 16p11.2 Copy Number Variations. ***NeuroImage*****,** *203*, 116155. https://doi.org/10.1016/j.neuroimage.2019.116155

Jønch, A. E., Douard, E., **Moreau, C.,** Van Dijck, A., Passeggeri, M., Kooy, F., Puechberty, J., Campbell, C., Sanlaville, D., Lefroy, H., Richetin, S., Pain, A., Geneviève, D., Kini, U., Le Caignec, C., Lespinasse, J., Skytte, A.-B., Isidor, B., Zweier, C., … 15q11.2 Working Group. (2019). Estimating the effect size of the 15Q11.2 BP1-BP2 deletion and its contribution to neurodevelopmental symptoms: recommendations for practice. ***Journal of Medical Genetics*****.** https://doi.org/10.1136/jmedgenet-2018-105879

Urchs, S., Armoza, J., **Moreau, C.**, Benhajali, Y., St-Aubin, J., Orban, P., & Bellec, P. (2019). MIST: A multi-resolution parcellation of functional brain networks. ***MNI Open Research***, *1*(3), 3. https://doi.org/10.12688/mniopenres.12767.2

van der Meer, D., Sønderby, I. E., Kaufmann, T., Walters, G. B., Abdellaoui, A., Ames, D., Amunts, K., Andersson, M., Armstrong, N. J., Bernard, M., Blackburn, N. B., Blangero, J., Boomsma, D. I., Brodaty, H., Brouwer, R. M., Bülow, R., Cahn, W., Calhoun, V. D., Caspers, S., ... **Moreau, C.**, … Andreassen, O. A. (2019). Association of Copy Number Variation of the 15q11.2 BP1-BP2 Region With Cortical and Subcortical Morphology and Cognition. ***JAMA Psychiatry***, 1–11. https://doi.org/10.1001/jamapsychiatry.2019.3779

Martin-Brevet, S., Rodríguez-Herreros, B., Nielsen, J. A., **Moreau, C.,** Modenato, C., Maillard, A. M., Pain, A., Richetin, S., Jønch, A. E., Qureshi, A. Y., Zürcher, N. R., Conus, P., 16p11.2 European Consortium, Simons Variation in Individuals Project (VIP) Consortium, Chung, W. K., Sherr, E. H., Spiro, J. E., Kherif, F., Beckmann, J. S., … Jacquemont, S. (2018). Quantifying the Effects of 16p11.2 Copy Number Variants on Brain Structure: A Multisite Genetic-First Study. ***Biological Psychiatry*****.** https://doi.org/10.1016/j.biopsych.2018.02.1176

Sønderby, I. E., Gústafsson, Ó., Doan, N. T., Hibar, D. P., Martin-Brevet, S., Abdellaoui, A., Ames, D., Amunts, K., Andersson, M., Armstrong, N. J., Bernard, M., Blackburn, N., Blangero, J., Boomsma, D. I., Bralten, J., Brattbak, H.-R., Brodaty, H., Brouwer, R. M., Bülow, R., … **Moreau, CA.**, ..., 16p11.2 European Consortium, for the ENIGMA-CNV working group.

(2018). Dose-response of the 16p11.2 distal copy number variant on intracranial volume and basal ganglia. ***Molecular Psychiatry***. https://doi.org/10.1038/s41380-018-0118-1