



HAL
open science

Comparative study of manual identification of brain foldings in a living human brain using a proxy-endocast obtained from MRI

Nicole Labra, Yann Leprince, Denis Rivière, Mathieu Santin, Jean François Mangin, Lou Albessard-Ball, Amélie Beaudet, Douglas Broadfield, Emiliano Bruner, Kristian J. Carlson, et al.

► To cite this version:

Nicole Labra, Yann Leprince, Denis Rivière, Mathieu Santin, Jean François Mangin, et al.. Comparative study of manual identification of brain foldings in a living human brain using a proxy-endocast obtained from MRI. *Bulletins et Mémoires de la Société d'anthropologie de Paris*, 2023, 35 ((s)), 10.4000/bmsap.11242 . hal-04125446

HAL Id: hal-04125446

<https://hal.science/hal-04125446v1>

Submitted on 5 Jul 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - ShareAlike 4.0 International License

Comparative study of manual identification of brain foldings in a living human brain using a proxy-endocast obtained from MRI

Étude comparative de l'identification manuelle des plis cérébraux sur un cerveau humain, en utilisant un proxy-endocast obtenu par IRM

Nicole Labra, Yann Leprince, Denis Rivière, Mathieu Santin, Jean François Mangin, Lou Albessard-Ball, Amélie Beaudet, Douglas Broadfield, Emiliano Bruner, Kristian J. Carlson, Zachary Cofran, Dean Falk, Emmanuel Gilissen, Aida Gómez-Robles, Simon Neubauer, Alannah Pearson, Carolin Röding, Yameng Zhang, Aurélien Mounier et Antoine Balzeau



Édition électronique

URL : <https://journals.openedition.org/bmsap/11242>
DOI : 10.4000/bmsap.11242
ISSN : 1777-5469

Éditeur

Société d'Anthropologie de Paris

Référence électronique

Nicole Labra, Yann Leprince, Denis Rivière, Mathieu Santin, Jean François Mangin, Lou Albessard-Ball, Amélie Beaudet, Douglas Broadfield, Emiliano Bruner, Kristian J. Carlson, Zachary Cofran, Dean Falk, Emmanuel Gilissen, Aida Gómez-Robles, Simon Neubauer, Alannah Pearson, Carolin Röding, Yameng Zhang, Aurélien Mounier et Antoine Balzeau, « Comparative study of manual identification of brain foldings in a living human brain using a proxy-endocast obtained from MRI », *Bulletins et mémoires de la Société d'Anthropologie de Paris* [En ligne], 35(S) | 2023, mis en ligne le 14 janvier 2023, consulté le 24 décembre 2023. URL : <http://journals.openedition.org/bmsap/11242> ; DOI : <https://doi.org/10.4000/bmsap.11242>

Ce document a été généré automatiquement le 24 décembre 2023.



Le texte seul est utilisable sous licence CC BY-NC-ND 4.0. Les autres éléments (illustrations, fichiers annexes importés) sont « Tous droits réservés », sauf mention contraire.

Comparative study of manual identification of brain foldings in a living human brain using a proxy-endocast obtained from MRI

Étude comparative de l'identification manuelle des plis cérébraux sur un cerveau humain, en utilisant un proxy-endocast obtenu par IRM

Nicole Labra, Yann Leprince, Denis Rivière, Mathieu Santin, Jean François Mangin, Lou Albessard-Ball, Amélie Beaudet, Douglas Broadfield, Emiliano Bruner, Kristian J. Carlson, Zachary Cofran, Dean Falk, Emmanuel Gilissen, Aida Gómez-Robles, Simon Neubauer, Alannah Pearson, Carolin Röding, Yameng Zhang, Aurélien Mounier et Antoine Balzeau

- 1 The use of virtual endocasts allows investigation of the folding configurations of the cerebral cortex of extinct species. However, is that really possible? Our goal is to help answer this question by qualifying and quantifying the subjective identifications of the foldings on endocasts compared to their real configurations on the brain. We invited 14 paleoneurologists to manually reconstruct the foldings they could recognize in a proxy-endocast obtained from an in-vivo MRI. MRI data were obtained on a volunteer (female, 33 y/o) during a unique session with complementary sequences. The brain structures segmentation and the folding labelling were obtained with Morphologist with the T1. The MRI UTE sequence was used to segment the bone and create the proxy-endocast with the BrainVisa software. Paleoneurologists were asked to label the endocast. Their manual reconstructions were compared with the real sulci using the Dice index in conjunction with a similarity measure based on position and shape of the foldings. Results show that foldings located closer to the base of the skull are more accurately identified in location and shape than those located in the superior region of the brain, such as the Central Sulcus that was largely misidentified and positioned closer to the precentral region. Traces that appear to be foldings but are not were also identified. The nature of some of these traces remains unknown while in

particular one misidentified trace corresponds to another type of structure: the parieto-occipital suture. We hope that the information presented in this work will help the palaeoanthropology community to be more careful with the identification of foldings that might be false or largely misidentified and to validate those that are generally well reconstructed, providing support and confidence in the subsequent studies that derive from them.

AUTEURS

NICOLE LABRA

UMR 7194 HNHP, MNHN, CNRS, UPVD, Département Homme et Environnement, Musée de l'Homme, Paris, France
n.labra[at]ucl.ac.uk

YANN LEPRINCE

UNIACT, NeuroSpin, CEA, Université Paris-Saclay, Gif-sur-Yvette, France

DENIS RIVIÈRE

Baobab, NeuroSpin, CEA, Université Paris-Saclay

MATHIEU SANTIN

Centre de Neuroimagerie de Recherche – CENIR, ICM – Institut du Cerveau et de la Moelle épinière, Hôpital Pitié-Salpêtrière, Paris, France

JEAN FRANÇOIS MANGIN

NeuroSpin, CEA, Université Paris-Saclay

LOU ALBESSARD-BALL

UMR 7194 HNHP, MNHN, CNRS, UPVD, Département Homme et Environnement, Musée de l'Homme, Paris, France ; PalaeoHub, Department of Archaeology, University of York, York, United Kingdom

AMÉLIE BEAUDET

Department of Archaeology, University of Cambridge, Cambridge, United Kingdom

DOUGLAS BROADFIELD

Department of Cell Biology, University of Miami, Miami, Florida, USA

EMILIANO BRUNER

Centro Nacional de Investigación sobre la Evolución Humana, Burgos, Spain

KRISTIAN J. CARLSON

Evolutionary Studies Institute, University of the Witwatersrand, Palaeosciences Centre, Johannesburg, Wits, South Africa ; Department of Integrative Anatomical Sciences, Keck School of Medicine, University of Southern California, Los Angeles, California, USA

ZACHARY COFRAN

Anthropology Department, Vassar College, Poughkeepsie, New York, USA

DEAN FALK

Florida State University, Tallahassee, Florida, USA

EMMANUEL GILISSEN

Department of African Zoology, Royal Museum for Central Africa, Tervuren, Belgium

AIDA GÓMEZ-ROBLES

Department of Anthropology, University College London, London, United Kingdom

SIMON NEUBAUER

Institute of Anatomy and Cell Biology, Johannes Kepler University Linz, Austria

ALANNAH PEARSON

School of Archaeology and Anthropology, Australian National University, Canberra, Australia

CAROLIN RÖDING

Paleoanthropology, Institute for Archaeological Sciences and Senckenberg Centre for Human Evolution and Paleoenvironment, Eberhard Karls University of Tübingen, Tübingen, Germany

YAMENG ZHANG

Institute of Cultural Heritage, Shandong University, Qingdao, Shandong, China

AURÉLIEN MOUNIER

UMR 7194 HNHP, MNHN, CNRS, UPVD, Département Homme et Environnement, Musée de l'Homme, Paris, France ; Turkana Basin Institute, Nairobi, Kenya

ANTOINE BALZEAU

UMR 7194 HNHP, MNHN, CNRS, UPVD, Département Homme et Environnement, Musée de l'Homme, Paris, France ; Department of African Zoology, Royal Museum for Central Africa, Tervuren, Belgium