John Muschelli

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GitHub: muschellij2

Education

2012–2016 **PhD**, *Biostatistics*,
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD.
Computational Methods for Neuroimaging in R: Stroke Hemorrhage in X-ray Computed Tomography Scanning
Advisor: Ciprian Crainiceanu, PhD

2008–2010 **ScM**, *Biostatistics*,
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD.
An Iterative Approach to Hemodynamic Response Function Temporal Derivatives in Statistical Parametric Mapping for Functional Neuroimaging
Advisor: Brian Caffo, PhD

2004–2008 **BS**, *Biomathematics and Neuroscience*,
The University of Scranton, Scranton, PA.
Advisors: Professor Jakub Jasinski, Professor J. Timothy Cannon

Relevant Experience

2016–Present **Assistant Scientist**, *Department of Biostatistics*, Johns Hopkins Bloomberg School of Public Health, (Research-track Faculty).

2012–2016 **Trainee**, *T32AG021334: Epidemiology and Biostatistics of Aging Training Grant*, Mentors: Dr. Michelle Carlson, Dr. Ravi Varadhan.

2009–2016 **Research Associate**, *Johns Hopkins Biostatistics Consulting Center*, Baltimore, MD.
Collaborated on statistical projects with senior consultants.
Weekly consulting for student research projects.
Report writing and analyzing data using statistical software: R, Stata.

2009–2014 **Data Analyst / Data Manager**, *Brain Injury Outcomes Division*, Baltimore, MD.
Decreased turnaround time on data safety report (from weeks to hours) by using knitr, LaTeX, and dynamic documents.
Created a standardized database and processing pipeline for CT images.
Analyzed phase II and III trials for treatment of intracerebral hemorrhage
Data management and consultation of electronic case report form (eCRF) creation.

2010–2012 **Data Analyst**, *Laboratory for Neurocognitive and Imaging Research at Kennedy Krieger Institute*, Baltimore, MD.
Reduced manual steps in complex imaging study analysis using automation from programming.
Analysis of functional MRI (fMRI) imaging studies using Statistical Parametric Mapping.
Programming consultant: Matlab & R.

Software

R Packages

All download counts are from RStudio CRAN logs and are accurate as of January 14, 2020.

rscopus: Scopus Database API Interface, *40908*.

fslr: Wrapper Functions for FSL (FMRIB Software Library) from Functional MRI of the Brain (FMRIB), *29804*.

neurobase: Neuroconductor Base Package with Helper Functions for nifti Objects, *22940*.

brainR: Helper Functions to misc3d and rgl Packages for Brain Imaging, *22838*.

matlabr: An Interface for MATLAB using System Calls, *20639*.

WhiteStripe: White Matter Normalization for Magnetic Resonance Images using WhiteStripe, *18286*.

diffr: Display Differences Between Two Files using Codediff Library, *18096*.

spm12r: Wrapper Functions for SPM (Statistical Parametric Mapping) Version 12 from the Wellcome Trust Centre for Neuroimaging, *11660*.

kirby21.base: Example Data from the Multi-Modal MRI Reproducibility Resource, *11014*.

gcite: Google Citation Parser, *10184*.

freesurfer: Wrapper Functions for Freesurfer, *10053*.

papayar: View Medical Research Images using the Papaya JavaScript Library, *9632*.

gifti: Reads in Neuroimaging GIFTI Files with Geometry Information, *9070*.

kirby21.t1: Example T1 Structural Data from the Multi-Modal MRI Reproducibility Resource, *8903*.

cifti: Toolbox for Connectivity Informatics Technology Initiative (CIFTI) Files, *8480*.

kirby21.fmri: Example Functional Imaging Data from the Multi-Modal MRI Reproducibility Resource, *8017*.

neurohcp: Human Connectome Project Interface, *7372*.

mscstts: R Client for the Microsoft Cognitive Services Text-to-Speech REST API, *7361*.

glassdoor: Interface to Glassdoor API, *7295*.

fedreporter: Interface to Federal RePORTER API, *6529*.

stapler: Simultaneous Truth and Performance Level Estimation, *6185*.

leanpubr: Leanpub API Interface, *4382*.

text2speech: Text to Speech, *3462*.

nsrr: Interface to National Sleep Research Resource, *3294*.

neurovault: Neurovault Database API Access, *533*.

GitHub   **drammsr: Port of Deformable Registration via Attribute Matching and Mutual-Saliency Weighting (DRAMMS) Registration to R**.

didactr: Tools for Creating Automated Courses.

flexconnr: FLEXCONN Model Wrapped in R .

extrantsr: Additional functionality and extensions to the ANTsR R package.

rcamino: R Port of Camino Software.

dcm2niir: R wrapper for dcm2nii DICOM converter.

ichseg: ICH Segmentation of CT scans.

msseg: MS Lesion Segmentation.

googleCite: Scraper for Google Citations.

processVISION: Scripts for Parsing XML from VISION database.

sri24: SRI24 Atlas: Normal Adult Brain Anatomy.

Shiny Web Applications

2016 **Segmentation of Intracranial Hemorrhage from CT Scans**,
http://johnmuschelli.com/ich_segment_all.html.

2015 **Abandoned Cars in Baltimore Finder**,
https://jmuschelli.shinyapps.io/Abandoned_Baltimore_Car.

Unofficial ENAR 2015 Itinerary Maker,
https://muschellij2.shinyapps.io/ENAR_2015.

2014 **Online DICOM TO NIfTI Converter**,
https://muschellij2.shinyapps.io/dcm2nii.

Cost of most common medical procedures at United States hospitals based on Centers for Medicare and Medicaid Services data,
https://jmuschelli.shinyapps.io/Shiny_Health_Data.

Peer-Reviewed Publications

* denotes authors contributed equally

2019 **Muschelli, J.** "Roc and auc with a binary predictor: a potentially misleading metric". *Journal of Classification.* In Press.

Muschelli, J. "Recommendations for processing head ct data". *Frontiers in Neuroinformatics* 13, p. 61. ISSN: 1662-5196. DOI: 10.3389/fninf.2019.00061. URL: https://www.frontiersin.org/article/10.3389/fninf.2019.00061.

Hadavand, A., **Muschelli, J.**, Leek, J., "Analysis of student behavior using the R package crsra". *Journal of Learning Analytics* 6.2, pp. 140–152.

2018 **Muschelli, J.**, Sweeney, E., Crainiceanu, C. M., "freesurfer: connecting the Freesurfer software with R". *F1000Research* 7.

Muschelli, J., Gherman, A., Fortin, J.-P., Avants, B., Whitcher, B., Clayden, J. D., Caffo, B. S., Crainiceanu, C. M., "Neuroconductor: an R platform for medical imaging analysis". *Biostatistics*, kxx068. DOI: 10.1093/biostatistics/kxx068. eprint: /oup/backfile/content_public/journal/biostatistics/pap/10.1093_biostatistics_kxx068/1/kxx068.pdf. URL: +http://dx.doi.org/10.1093/biostatistics/kxx068.

Commowick, O., Istace, A., Kain, M., Laurent, B., Leray, F., Simon, M., Pop, S. C., Girard, P., Ameli, R., Ferré, J.-C., Kerbrat, A., Tourdias, T., Cervenansky, F., Glatard, T., Beaumont, J., Doyle, S., Forbes, F., Knight, J., Khademi, A., Mahbod, A., Wang, C.,

Mckinley, R., Wagner, F., **Muschelli, J.**, Sweeney, E., Roura, E., Lladó, X., Santos, M. M., Santos, W. P., Silva-Filho, A. G., Tomas-Fernandez, X., Urien, H., Bloch, I., Valverde, S., Cabezas, M., Vera-Olmos, F. J., Malpica, N., Guttmann, C., Vukusic, S., Edan, G., Dojat, M., Styner, M., Warfield, S. K., Cotton, F., Barillot, C., "Objective evaluation of multiple sclerosis lesion segmentation using a data management and processing infrastructure". *Scientific Reports*.

Smith, C. H., Turbitt, E., **Muschelli, J.**, Leonard, L., Lewis, K. L., Freedman, B., Muratori, M., Biesecker, B. B., "Feasibility of coping effectiveness training for caregivers of children with autism spectrum disorder: a genetic counseling intervention". *Journal of genetic counseling* 27.1, pp. 252–262.

Valcarcel, A., **Muschelli, J**, Crainiceanu, C, Pham, D., Calabresi, P., Bakshi, R, Shinohara, R., "TAPAS: threshold adjustment to probability map automatic segmentations". *MULTIPLE SCLEROSIS JOURNAL*. Vol. 24, pp. 629–630.

Valcarcel, A. M., Linn, K. A., Vandekar, S. N., Satterthwaite, T. D., **Muschelli, J.**, Calabresi, P. A., Pham, D. L., Martin, M. L., Shinohara, R. T., "MIMoSA: an automated method for intermodal segmentation analysis of multiple sclerosis brain lesions". *Journal of Neuroimaging*.

2017 **Muschelli, J.**, Sweeney, E. M., Ullman, N. L., Vespa, P., Hanley, D. F., Crainiceanu, C. M., "PItcHPERFeCT: primary intracranial hemorrhage probability estimation using random forests on CT". *NeuroImage: Clinical* 14, pp. 379 –390. ISSN: 2213-1582. DOI: `http://dx.doi.org/10.1016/j.nicl.2017.02.007`. URL: `http://www.sciencedirect.com/science/article/pii/S2213158217300414`.

Hanley, D. F., Lane, K., McBee, N., Ziai, W., Tuhrim, S., Lees, K. R., Dawson, J., Gandhi, D., Ullman, N., Mould, W. A., Mayo, S. W., Mendelow, A. D., Gregson, B., Butcher, K., Vespa, P., Wright, D. W., Kase, C. S., Carhuapoma, J. R., Keyl, P. M., Diener-West, M., **Muschelli, J.**, Betz, J. F., Thompson, C. B., Sugar, E. A., Yenokyan, G., Janis, S., John, S., Harnof, S., Lopez, G. A., Aldrich, E. F., Harrigan, M. R., Ansari, S., Jallo, J., Caron, J.-L., LeDoux, D., Adeoye, O., Zuccarello, M., Adams, H. P., Rosenblum, M., Thompson, R. E., Awad, I. A., "Thrombolytic removal of intraventricular haemorrhage in treatment of severe stroke: results of the randomised, multicentre, multiregion, placebo-controlled CLEAR III trial". *The Lancet* 389.10069, pp. 603–611.

Kickingereder, P., Neuberger, U., Bonekamp, D., Piechotta, P., Götz, M., Wick, A., Sill, M., Kratz, A., Shinohara, R., Jones, D., Radbruch, A., **Muschelli, J.**, Unterberg, A., Debus, J., Schlemmer, H.-P., Herold-Mende, C., Pfister, S., von Deimling, A., Wick, W., Capper, D., Maier-Hein, K., Bendszus, M., "Radiomic subtyping improves disease stratification beyond key molecular, clinical and standard imaging characteristics in patients with glioblastoma." *Neuro-Oncology*.

Maier, O., Menze, B., von der Gablentz, J., Häni, L., Heinrich, M., Liebrand, M., Winzeck, S., Basit, A., Bentley, P., Chen, L., Christiaens, D., Dutil, F., Egger, K., Feng, C., Glocker, B., Götz, M., Haeck, T., Halme, H.-L., Havaei, M., Iftekharuddin, K., Jodoin, P.-M., Kamnitsas, K., Kellner, E., Korvenoja, A., Larochelle, H., Ledig, C., Lee, J.-H., Maes, F., Mahmood, Q., Maier-Hein, K., McKinley, R., **Muschelli, J.**, Pal, C., Pei, L., Rangarajan, J., Reza, S., Robben, D., Rueckert, D., Salli, E., Suetens, P., Wang, C.-W., Wilms, M., Kirschke, J., Krämer, U., Münte, T., Schramm, P., Wiest, R., Handels, H., Reyes, M., "ISLES 2015 - a public evaluation benchmark for ischemic stroke lesion segmentation from multispectral MRI". *Medical Image Analysis* 35. cited By 14, pp. 250–269. DOI: `10.1016/j.media.2016.07.009`. URL: `https://www.`

scopus.com/inward/record.uri?eid=2-s2.0-84979950799&doi=10.1016%2fj.
media.2016.07.009&partnerID=40&md5=15537a210adbbc102bcef75103bee7df.

2016   Bundy, D. G., **Muschelli, J.**, Clemens, G. D., Strouse, J. J., Thompson, R. E., Casella, J. F., Miller, M. R., "Preventive care delivery to young children with sickle cell disease". *Journal of pediatric hematology/oncology* 38.4, pp. 294–300.

Fortin, J.-P., Sweeney, E. M., **Muschelli, J.**, Crainiceanu, C. M., Shinohara, R. T., Initiative, A. D. N., "Removing inter-subject technical variability in magnetic resonance imaging studies". *NeuroImage* 132, pp. 198–212.

Hanley, D. F., Thompson, R. E., **Muschelli, J.**, Rosenblum, M., McBee, N., Lane, K., Bistran-Hall, A. J., Mayo, S. W., Keyl, P., Gandhi, D., Morgan, T. C., Ullman, N., Mould, W. A., Carhuapoma, J. R., Kase, C., Ziai, W., Thompson, C. B., Yenokyan, G., Huang, E., Broaddus, W. C., Graham, R. S., Aldrich, E. F., Dodd, R., Wijman, C., Caron, J.-L., Huang, J., Camarata, P., Mendelow, A. D., Gregson, B., Janis, S., Vespa, P., Martin, N., Awad, I., Zuccarello, M., "Safety and efficacy of minimally invasive surgery plus alteplase in intracerebral haemorrhage evacuation (MISTIE): a randomised, controlled, open-label, phase 2 trial". *The Lancet Neurology* 15.12, pp. 1228–1237.

Kickingereder, P, Götz, M, **Muschelli, J**, Wick, A, Neuberger, U, Shinohara, R, Radbruch, A, Schlemmer, H, Wick, W, Bendszus, M, Maier-Hein, K, Bonekamp, D, "Large-scale radiomic profiling of glioblastoma identifies an imaging signature for predicting and stratifying antiangiogenic treatment response". *RöFo-Fortschritte auf dem Gebiet der Röntgenstrahlen und der bildgebenden Verfahren*. Vol. 188. S 01, WISS301_1.

Sweeney, E. M., Shinohara, R. T., Dewey, B. E., Schindler, M. K., **Muschelli, J.**, Reich, D. S., Crainiceanu, C. M., Eloyan, A., "Relating multi-sequence longitudinal intensity profiles and clinical covariates in incident multiple sclerosis lesions". *NeuroImage: Clinical* 10, pp. 1–17.

2015   **Muschelli, J.**, Ullman, N. L., Mould, W. A., Vespa, P., Hanley, D. F., Crainiceanu, C. M., "Validated automatic brain extraction of head CT images". *NeuroImage* 114, pp. 379–385.

Muschelli, J., Sweeney, E., Lindquist, M., Crainiceanu, C., "fslr: connecting the FSL software with R". *R Journal* 7.1, pp. 163–175.

Muschelli, J., Ullman, N. L., Sweeney, E. M., Eloyan, A., Martin, N., Vespa, P., Hanley, D. F., Crainiceanu, C. M., "Quantitative intracerebral hemorrhage localization". *Stroke* 46.11, pp. 3270–3273.

Choe, A. S., Jones, C. K., Joel, S. E., **Muschelli, J.**, Belegu, V., Caffo, B. S., Lindquist, M. A., van Zijl, P. C., Pekar, J. J., "Reproducibility and temporal structure in weekly resting-state fmri over a period of 3.5 years". *PloS one* 10.10, e0140134.

Webb, A. J., Ullman, N. L., Morgan, T. C., **Muschelli, J.**, Kornbluth, J., Awad, I. A., Mayo, S., Rosenblum, M., Ziai, W., Aldrich, Zuccarrello, F. M., John, S., Harnof, S., Lopez, G., Broaddus, W. C., Wijman, C., Vespa, P., Bullock, R., Haines, S. J., Cruz-Flores, S., Tuhrim, S., Hill, M. D., Narayan, R., Hanley, D. F., "Accuracy of the ABC/2 score for intracerebral hemorrhage systematic review and analysis of MISTIE, CLEAR-IVH, and CLEAR III". *Stroke* 46.9, pp. 2470–2476.

2014   **Muschelli, J.**, Sweeney, E., Crainiceanu, C., "brainR: interactive 3 and 4D images of high resolution neuroimage data". *R Journal* 6.1, pp. 41–48.

Muschelli, J., Betz, J., Varadhan, R., "Binomial regression in R". *Handbook of Statistics: Computational Statistics with R* 32, pp. 257–309.

Muschelli*, J., Nebel*, M. B., Caffo, B. S., Barber, A. D., Pekar, J. J., Mostofsky, S. H., "Reduction of motion-related artifacts in resting state fMRI using aCompCor". *NeuroImage* 96, pp. 22–35.

Eloyan, A., Li, S., **Muschelli, J.**, Pekar, J. J., Mostofsky, S. H., Caffo, B. S., "Analytic programming with fMRI data: a quick-start guide for statisticians using R". *PLOS ONE* 9.2, e89470.

Nebel, M. B., Joel, S. E., **Muschelli, J.**, Barber, A. D., Caffo, B. S., Pekar, J. J., Mostofsky, S. H., "Disruption of functional organization within the primary motor cortex in children with autism". *Human Brain Mapping* 35.2, pp. 567–580.

2013   Mould, W. A., Carhuapoma, J. R., **Muschelli, J.**, Lane, K., Morgan, T. C., McBee, N. A., Bistran-Hall, A. J., Ullman, N. L., Vespa, P., Martin, N. A., Awad, I., Zuccarello, M., Hanley, D. F., "Minimally invasive surgery plus recombinant tissue-type plasminogen activator for intracerebral hemorrhage evacuation decreases perihematomal edema". *Stroke* 44.3, pp. 627–634.

Mould, W., Carhuapoma, J., **Muschelli, J**, Lane, K, Morgan, T., McBee, N., Bistran-Hall, A., Ullman, N., Vespa, P, Martin, N., Awad, I., Zuccarello, M., Hanley, D. F., "MISTIE investigators: minimally invasive surgery plus recombinant tissue-type plasminogen activator for intracerebral hemorrhage evacuation decreases perihematomal edema". *Stroke* 44.3, pp. 627–634.

2012   Bundy, D. G., **Muschelli, J.**, Clemens, G. D., Strouse, J. J., Thompson, R. E., Casella, J. F., Miller, M. R., "Ambulatory care connections of medicaid-insured children with sickle cell disease". *Pediatric Blood & Cancer* 59.5, pp. 888–894.

Eloyan, A., **Muschelli, J.**, Nebel, M. B., Liu, H., Han, F., Zhao, T., Barber, A. D., Joel, S., Pekar, J. J., Mostofsky, S. H., "Automated diagnoses of attention deficit hyperactive disorder using magnetic resonance imaging". *Frontiers in Systems Neuroscience* 6, p. 6.

Hinson, H. E., Melnychuk, E., **Muschelli, J.**, Hanley, D. F., Awad, I. A., Ziai, W. C., "Drainage efficiency with dual versus single catheters in severe intraventricular hemorrhage". *Neurocritical Care* 16.3, pp. 399–405.

Jaffe, J., Melnychuk, E., **Muschelli, J.**, Ziai, W., Morgan, T., Hanley, D. F., Awad, I. A., "Ventricular catheter location and the clearance of intraventricular hemorrhage". *Neurosurgery* 70.5, pp. 1258–1264.

Webb, A. J., Ullman, N. L., Mann, S., **Muschelli, J.**, Awad, I. A., Hanley, D. F., "Resolution of intraventricular hemorrhage varies by ventricular region and dose of intraventricular thrombolytic the clot lysis: evaluating accelerated resolution of IVH (CLEAR IVH) program". *Stroke* 43.6, pp. 1666–1668.

Ziai, W. C., **Muschelli, J.**, Thompson, C. B., Keyl, P. M., Lane, K., Shao, S., Hanley, D. F., "Factors affecting clot lysis rates in patients with spontaneous intraventricular hemorrhage". *Stroke* 43.5, pp. 1234–1239.

2011   Newell, D. W., Shah, M. M., Wilcox, R., Hansmann, D. R., Melnychuk, E., **Muschelli, J.**, Hanley, D. F., "Minimally invasive evacuation of spontaneous intracerebral hemorrhage using sonothrombolysis". *Journal of Neurosurgery* 115.3, pp. 592–601.

Niedner, M. F., Huskins, W. C., Colantuoni, E., **Muschelli, J.**, Harris, J. M., Rice, T. B., Brilli, R. J., Miller, M. R., "Epidemiology of central line-associated bloodstream infections in the pediatric intensive care unit". *Infection Control* 32.12, pp. 1200–1208.

Working Groups

2014–Present **Statistical and Applied Mathematical Sciences Institute (SAMSI) working group on Clinical Brain Imaging**.

2012–2016 **Epidemiology and Biostatistics of Aging (EBA) Training Program Meeting**, *Johns Hopkins University, Center on Aging and Health*.

2014–Present **Penn Statistical Imaging and Visualization Endeavor (PennSIVE) Working Group**, *University of Pennsylvania, Department of Biostatistics and Epidemiology*.

2009–Present **Statistical Methods and Applications for Research in Technology (SMART) Working Group**, *Johns Hopkins University, Department of Biostatistics*.

Talks and Presentations

2018 **Neuroconductor and Reproducibility: Imaging in R**, *Joint Statistical Meeting (JSM)*, Vancouver, BC, Canada, Talk.

2018 **Submitting to CRAN and Continuous Integration**, *R Package Hackathon at Statistics in Imaging Conference*, Philadelphia, PA, Talk and Hackathon Co-organizer.

2018 **Imaging Statistics in R**, *Statistics in Imaging Conference*, Philadelphia, PA, Talk.

2018 **Neuroimaging Analysis within R**, *Eastern North American Region (ENAR)*, Atlanta, GA, Short Course.

2018 **Robust Lesion Segmentation on MRI of Patients with Multiple Sclerosis**, *Genentech*, South San Francisco, CA, Talk.

2017 **Neuroconductor: A Framework for a Framework for Reproducible Neuroimaging Analysis in R**, *Eastern North American Region (ENAR)*, Washington, DC, Poster.

2017 **Creating Interactive Graphics**, *Joint Statistical Meeting (JSM)*, Baltimore, MD, Discussant and Organizer.

2016 **Papayar: A Better Interactive Neuroimage Plotter in R**, *Joint Statistical Meeting (JSM)*, Chicago, IL, Talk.

2016 **Processing Neuroimaging Data in R: Capabilities**, *Mathematical and Statistical Challenges in Neuroimaging Data Analysis*, Banff, AB, Talk.

2016 **Processing fMRI Data in R**, *SAMSI Challenges in Functional Connectivity Modeling and Analysis Workshop*, Durham, NC, Talk.

2015 **Succeeding in Undergraduate: A Message to Top Students**, *Sun Valley High School*, Aston, PA, Talk.

SuBGELS: Subtraction-Based Gadolinium-Enhancing Lesion Segmentation, *Hopkins Imaging Conference*, Baltimore, MD, Poster.

Automated Intracerebral Hemorrhage Segmentation of CT Scans, *Joint Statistical Meeting (JSM)*, Seattle, WA, SPEED Talk and Poster.

PItcHPERFECT: Primary Intracerebral Hemorrhage Prediction Employing Regression and Features Extracted from CT,
Eastern North American Region (ENAR), Miami, FL, Poster.

Quantitative Localization and Predictive Performance of Intracranial Hemorrhage,
International Stroke Conference (ISC), Nashville, TN, Poster.

Validated Automatic Brain Extraction of Head CT Images,
Organization for Human Brain Mapping (OHBM), Honolulu, HI, Poster.

2014   **Validated Automatic Brain Extraction of Head CT Images**,
Hopkins Imaging Conference, Baltimore, MD, Talk and Poster.

Reduction of motion-related artifacts in resting state fMRI using aCompCor,
Hopkins Imaging Conference, Baltimore, MD, Poster.
Award: Top Poster

2013   **Visualizing Brain Imaging in Interactive 3D**,
ENAR, Orlando, FL, Talk.

2012   **Resting State Preprocessing and Motion Artifacts**,
Second Biennial Conference on Resting State, Madgeburg, Germany, Poster.

Effects of preprocessing on motion-inuced artifacts in resting state fMRI,
Society for Neuroscience (SfN), New Orleans, LA, Poster.