

Alexander J. Billig, PhD

UCL Ear Institute
332 Gray's Inn Road
London, WC1X 8EE
United Kingdom
+44 7909 923491
a.billig@ucl.ac.uk

EDUCATION AND TRAINING

- 2017 – present Postdoctoral Research Associate
UCL Ear Institute, London, UK
Supervisors: Tim Griffiths, Maria Chait
- 2016 – 2017 Postdoctoral Research Fellow/Associate
Brain and Mind Institute, University of Western Ontario, London, ON, Canada
Supervisor: Ingrid Johnsrude
- 2012 – 2015 PhD in Biological Sciences
MRC Cognition and Brain Sciences Unit, Cambridge, UK
Thesis: *High-Level Influences on Auditory Streaming*
Supervisors: Bob Carlyon, Matt Davis
- 2010 – 2011 MSc in Music, Mind & Brain (Distinction)
Goldsmiths College, University of London, UK
- 1998 – 2001 BA (Hons) in Mathematics
St Hugh's College, University of Oxford, UK

SELECTED ADDITIONAL EMPLOYMENT

- 2001 – 2011 Analyst/Associate/Director;
Morgan Stanley, London, UK
Managed operations teams, technology/business development projects

PUBLICATIONS

- Milne, A.E., Bianco, R., Poole, K.C., Zhao, S., **Billig, A.J.**, & Chait, M. (submitted). An online headphone screening test based on dichotic pitch. Preprint available at <https://www.biorxiv.org/content/10.1101/2020.07.21.214395v1>
- Kumar, S., Gander, P.E., Berger, J.I., **Billig, A.J.**, Nourski, K.V., Oya, H., Kawasaki, H., Howard, M.A., & Griffiths, T.D. (submitted). Oscillatory correlates of auditory working memory examined with human electrocorticography. Preprint available at <https://www.biorxiv.org/content/10.1101/2020.06.19.161901v1>

- Friston, K.J., Parr, T., Zeidman, P., Razi, A., Flandin, G., Daunizeau, J., Hulme, O., **Billig, A.J.**, Litvak, V., Price, C.J., Moran, R.J., Costello, A., Pillay, D., & Lambert, C. (submitted). Effective immunity and second waves: a dynamic causal modelling study. Preprint available at <https://arxiv.org/pdf/2006.09429.pdf>
- Moran, R.J., **Billig, A.J.**, Cullen, M., Zeidman, P., Flandin, G., Razi, A., Daunizeau, J., Leech, R., & Friston, K.J. (submitted). Using the LIST model to estimate the effects of contact tracing on COVID-19 endemic equilibria in England and its regions. Preprint available at <https://www.medrxiv.org/content/10.1101/2020.06.11.20128611v1.full.pdf>
- Rocchi, F., Oya, H., Balezeau, F., **Billig, A.J.**, Kocsis, Z., Jenison, R., Nourski, K.V., Kovach, C., Steinschneider, M., Kikuchi, Y., Kawasaki, H., Adolphs, R., Greenlee, J., Griffiths, T.D., Howard, M.A., & Petkov, C.I. (under review). Common fronto-temporal effective connectivity in humans and monkeys. Preprint available at <https://doi.org/10.1101/2020.04.03.024042>
- Griffiths, T.D., Lad, M., Kumar, S., Holmes, E., McMurray, B., Maguire, E.A., **Billig, A.J.***, & Sedley, W.* (in press). How can hearing loss cause dementia? *Neuron*. <https://doi.org/10/1016/j.neuron.2020.08.003>
- Friston, K.J., Parr, T., Zeidman, P., Razi, A., Flandin, G., Daunizeau, J., Hulme, O., **Billig, A.J.**, Litvak, V., Moran, R.J., Price, C.J., & Lambert, C. (2020). Tracking and tracing in the UK: a dynamic causal modelling study [version 1; peer review: 1 approved with reservations]. *Wellcome Open Research*, 5(144). <https://doi.org/10.12688/wellcomeopenres.16004.1>
- Friston, K.J., Parr, T., Zeidman, P., Razi, A., Flandin, G., Daunizeau, J., Hulme, O., **Billig, A.J.**, Litvak, V., Price, C.J., Moran, R.J., & Lambert, C. (2020). Second waves, social distancing, and the spread of COVID-19 across America [version 1; peer review: 1 approved with reservations]. *Wellcome Open Research*, 5(103). <https://doi.org/10.12688/wellcomeopenres.15986.1>
- Friston, K.J., Parr, T., Zeidman, P., Razi, A., Flandin, G., Daunizeau, J., Hulme, O., **Billig, A.J.**, Litvak, V., Moran, R.J., Price, C.J., & Lambert, C. (2020). Dynamic causal modelling of COVID-19 [version 2; peer review: 2 approved]. *Wellcome Open Research*, 5(89). <https://doi.org/10.12688/wellcomeopenres.15881.2>
- Canales-Johnson, A., **Billig, A.J.**, Olivares, F., Gonzalez, A., Garcia, M.D.C, Silva, W., Vouchert, E., Ciruolo, C., Mikulan, E., Ibanez, A., Noreika, V., Chennu, S., & Bekinschtein, T. (2020). Dissociable neural information dynamics of perceptual integration and differentiation during bistable perception. *Cerebral Cortex*, 30(8), 4563-4580. <https://doi.org/10.1093/cercor/bhaa058>
- Billig, A.J.***, Herrmann, B.*, Rhone, A.E., Gander, P.E., Nourski, K.V., Snoad, B.F., Kovach, C.K., Kawasaki, H., Howard, M.A., & Johnsrude I.S. (2019). A sound-sensitive source of alpha oscillations in human non-primary auditory cortex. *Journal of Neuroscience*, 39(44), 8679-8689. <https://doi.org/10.1523/JNEUROSCI.0696-19.2019>
- Billig, A.J.**, Davis, M.H., & Carlyon, R.P. (2018). Neural decoding of bistable sounds reveals an effect of intention on perceptual organization. *Journal of Neuroscience*, 38(11), 2844-2853. <https://doi.org/10.1523/JNEUROSCI.3022-17.2018>
- Carlyon, R.P., Guérit, F., **Billig, A.J.**, Tam, Y.C., Harris, F., & Deeks, J.M. (2018). Effect of chronic stimulation and stimulus level on temporal processing by cochlear implant listeners. *Journal of the Association for Research in Otolaryngology*, 20(2), 169-185. <https://doi.org/10.1007/s10162-018-00706-y>

- Carlyon, R.P., Deeks, J.M., Guérit, F., Lamping, W., **Billig, A.J.**, Large, C.H., Saheed, S.R., & Harris, P. (2018). Effects of a potassium channel modulator on temporal processing by cochlear implant listeners. *Journal of the Association for Research in Otolaryngology*, 19(6), 669-680. <https://doi.org/10.1007/s10162-018-00694-z>
- Billig, A.J.**, & Carlyon, R.P. (2016). Automaticity and primacy of auditory streaming: concurrent subjective and objective measures. *Journal of Experimental Psychology: Human Perception and Performance*, 42(3), 339-353. <http://doi.org/10.1037/xhp0000146>
- Bierer, J.A., Deeks, J.M., **Billig, A.J.**, & Carlyon, R.P. (2015). Comparison of signal and gap detection thresholds for focused and broad cochlear implant electrode configurations. *Journal of the Association for Research in Otolaryngology*, 16(2), 273-284. <http://doi.org/10.1007/s10162-015-0507-y>
- Billig, A.J.**, Davis, M.H., Deeks, J.M., Monstrey, J., & Carlyon, R.P. (2013). Lexical influences on auditory streaming. *Current Biology*, 23(16), 1585-1589. <http://doi.org/10.106/j.cub.2013.06.042>
- Billig, A.J.** & Müllensiefen, D. (2012). Comparing models of contour in music and speech. In E. Cambouropoulos, C. Tsougras, P. Mavromatis, & K. Pasteris (Eds.), *Proceedings of the 12th International Conference on Music Perception and Cognition and the 8th Triennial Conference of the European Society for the Cognitive Sciences of Music, July 23-28, 2012* (pp. 95-96) Thessaloniki, Greece: School of Music Studies, Aristotle University of Thessaloniki. http://icmpc-escom2012.web.auth.gr/files/papers/95_Proc.pdf

* Joint first or senior authorship

KEY SKILLS

Range of research methods: EEG, MEG, ECoG, fMRI, psychophysics, cochlear implant direct stimulation

Quantitative background: Broad mathematical training, strong analysis skills, programming in MATLAB/Python/R/ePrime/Presentation

Business experience: Planning and implementing technological and procedural change in fast-moving environment in financial sector; managing people and budgets; developing and delivering training plans

Other skills and interests: Worked as professional musician; strong interest in languages

AWARDS AND GRANTS

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| 2017 - 2018 | BrainsCAN Accelerator Stimulus Grant (University of Western Ontario / Canada First Research Excellence Fund) “ <i>Characterizing auditory cortical receptive fields</i> ” (co-applicant) - USD 43,300 |
| 2016 | Society for Neurobiology of Language Travel Award – USD 600 |
| 2015 - 2019 | Guarantors of Brain Travel Grants – USD 3,500 |
| 2014 – 2015 | Cambridge Philosophical Society Travel Grants – USD 200 |

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| 2013 – 2015 | Robinson College Cambridge Academic Expenses Fund - USD 750 |
| 2013 - 2019 | Association of Research in Otolaryngology Travel Awards - USD 1,000 |
| 2012 – 2015 | Medical Research Council Doctoral Training Award Studentship – USD 63,000 total stipend |

ORGANIZED/HOSTED SYMPOSIA

- 2019 Host of Session at *23rd International Congress on Acoustics*, Aachen, Germany. Parcellating the functions of human auditory cortex.
- 2018 Co-organizer/host of Young Investigator Symposium with Dr. Emma Holmes at *41st Annual Midwinter Meeting of the Association for Research in Otolaryngology*, San Diego, CA, USA. Non-acoustic influences on speech perception in normal and impaired hearing.

INVITED TALKS

- 2019 Wellcome Centre for Human Neuroimaging, London, UK
- 2019 Exeter University, Exeter, UK
- 2018 Cambridge Hearing Group, Cambridge, UK
- 2018 Goldsmiths College, London, UK
- 2018 Institute of Neuroscience, Newcastle University, UK
- 2017 UCL Ear Institute, London, UK
- 2017 Department of Psychology, University of Oxford, Oxford, UK
- 2017 Human Brain Research Laboratory, University of Iowa, Iowa City, IA, USA
- 2015 Institute for Systems Research, University of Maryland, Baltimore, MD, USA
- 2015 Institute for Neural Computation, University of California, San Diego, CA, USA
- 2015 Robinson College, University of Cambridge, Cambridge, UK
- 2014 CamBRAIN NeuroTalks, Cambridge, UK

CONFERENCE TALKS

- Billig, A.J.**, Herrmann, B., Rhone, A.E., Gander, P.E., Nourski, K.V., Snoad, B.F., Kovach, C.K., Kawasaki, H., Howard, M.A., & Johnsrude I.S. (2019). Talk at *23rd International Congress on Acoustics*, Aachen, Germany. Spectral properties of primary and non-primary auditory cortical activity.
- Billig, A.J.**, Gander, P.E., Kovach, C., Kawasaki, H., Howard, M.A., Griffiths, T., & Chait, M. (2019). Talk at *British Society of Audiologists Basic Auditory Science Meeting*, London, UK. Distinct contributions of primary and non-primary auditory cortical fields to regularity processing.
- Billig, A.J.**, Davis, M.H., Gander, P.E., Rhone, A.E., Nourski, K.V., Howard, M.A., Johnsrude, I.S., & Carlyon, R.P. (2018). Talk at *22nd Meeting of the Association for the Scientific Study of Consciousness*, Krakow, Poland. High-level influences on auditory bistability.

- Billig, A.J.**, Nourski, K.V., Rhone, A.E., Gander, P.E., Howard, M.A., & Johnsrude, I.S. (2018). Talk at *41st MidWinter Meeting of the Association for Research in Otolaryngology*, San Diego, CA, USA. Linguistic knowledge affects auditory streaming of speech: Insights from intracranial recordings and functional magnetic resonance imaging.
- Billig, A.J.**, Davis, M.H., & Carlyon, R.P. (2015). Talk at *38th MidWinter Meeting of the Association for Research in Otolaryngology*, Baltimore, MD, USA. Can we choose to integrate or segregate? Effects of task instruction on subjective and electromagnetic measures of auditory streaming.
- Carlyon, R.P., **Billig, A.J.**, Deeks, J.M., Monstrey, J., & Davis, M.H. (2013). Talk at *36th MidWinter Meeting of the Association for Research in Otolaryngology*, Baltimore, MD, USA. Auditory streaming of syllables: Words fuse more readily than non-words.
- Carlyon, R.P., **Billig, A.J.**, Deeks, J.M., Monstrey, J., & Davis, M.H. (2012). Talk at *3rd Annual Conference and Experimental and Clinical Short Papers Meeting of the British Society of Audiology*, Nottingham, UK. Auditory streaming of syllables: Words fuse more readily than non-words.
- Billig, A.J.** & Müllensiefen, D. (2012). Talk at *Music and Shape Conference*, London, UK. Crossmodal representations of contour in music and speech.

POSTER PRESENTATIONS

- Billig, A.J.**, Gander, P.E., Kovach, C., Kawasaki, H., Griffiths, T.D., Johnsrude, I.S., Howard, M.A., Chait, M. (2020). Poster at *43rd Annual Midwinter Meeting of the Association for Research in Otolaryngology*, San Jose, CA, USA. Signatures of auditory regularity in low- and high-frequency activity recorded from human primary and nonprimary auditory cortex.
- Billig, A.J.**, Gander, P.E., Kovach, C., Kawasaki, H., Howard, M.A., Griffiths, T.D., & Chait, M. (2019). Poster at *1st Brain Music Cognition Conference*, Jerusalem, Israel. Signatures of auditory regularity in low- and high-frequency activity recorded from human primary and nonprimary auditory cortex.
- Billig, A.J.**, Gander, P.E., Sedley, W., Chait, M., Kawasaki, H., Kovach, C.K., Howard, M.A., Griffiths, T.D. (2019). Poster at *42nd Annual Midwinter Meeting of the Association for Research in Otolaryngology*, Baltimore, MD, USA. Active tracking of sound textures: a human intracranial study.
- Billig, A.J.**, Gander, P.E., Sedley, W., Chait, M., Kawasaki, H., Kovach, C.K., Howard, M.A., Griffiths, T.D. (2018). Poster at *48th Annual Meeting of the Society for Neuroscience*, San Diego, CA, USA. Active tracking of sound textures: a human intracranial study.
- Billig, A.J.**, Gander, P.E., Sedley, W., Chait, M., Kawasaki, H., Kovach, C.K., Howard, M.A., Griffiths, T.D. (2018). Poster at *Advances and Perspectives in Auditory Neuroscience*, San Diego, CA, USA. Active tracking of sound textures: a human intracranial study.
- Billig, A.J.**, Gander, P.E., Sedley, W., Chait, M., Kawasaki, H., Kovach, C.K., Howard, M.A., Griffiths, T.D. (2018). Poster at *British Society of Audiologists Basic Auditory Science Meeting*, Newcastle, UK. Active tracking of sound textures: a human intracranial study.
- Billig, A.J.***, Herrmann, B.*, Rhone, A.E., Gander, P.E., Nourski, K.V., Howard, M.A., Johnsrude, I.S. (2018). Poster at *41st Annual Midwinter Meeting of the Association for Research in Otolaryngology*, San Diego, CA, USA. Alpha oscillations within human auditory cortex: An intracranial electrophysiology study.

- Carlyon, R.P., Deeks, J.M., Guérit, F., Lamping, W., **Billig, A.J.**, Large, C. (2017). Poster at *41st Annual Midwinter Meeting of the Association for Research in Otolaryngology*, San Diego, CA, USA. Effects of a potassium channel modulator on temporal processing by cochlear implant users: The QuickK+fire study.
- Billig, A.J.**, Rhone, A.E., Gander, P.E., Nourski, K.V., Wild, C.J., Howard, M.A., Johnsrude, I.S. (2017). Poster at *SNAP Workshop*, Lübeck, Germany. Reconstruction of noise-vocoded speech from primary auditory cortex during perceptual pop-out.
- Carlyon, R.P., Guérit, F., Lamping, W., **Billig, A.J.**, Harris, P., & Deeks, J.M. (2017). Poster at *Conference on Implantable Auditory Prostheses*, Lake Tahoe, CA, USA. The effect of an oral modulator of fast-acting potassium channels on temporal processing by cochlear implant users.
- Deeks, J.M., Guérit, F.M., **Billig, A.J.**, Tam, Y.C., Harris, F., & Carlyon, R.P. (2017). Poster at *Conference on Implantable Auditory Prostheses*, Lake Tahoe, CA, USA. Effect of chronic stimulation and level on temporal pitch perception by cochlear-implant listeners.
- Billig, A.J.**, Rhone, A.E., Gander, P.E., Nourski, K.V., Wild, C.J., Howard, M.A., Johnsrude, I.S. (2017). Poster at *40th Annual Midwinter Meeting of the Association for Research in Otolaryngology*, Baltimore, MD, USA. Intracranial recordings of primary auditory cortical activity during pop-out of degraded speech based on matching visual information.
- Carlyon, R.P., Guérit, F., **Billig, A.J.**, Tam, Y.C., Harris, F., & Deeks, J.M. (2017). Poster at *40th Annual Midwinter Meeting of the Association for Research in Otolaryngology*, Baltimore, MD, USA. Temporal pitch perception by cochlear-implant listeners measured at switch-on and after 2 months.
- Billig, A.J.**, Davis, M.H., & Carlyon, R.P. (2016). Poster at *46th Annual Meeting of the Society for Neuroscience*, San Diego, CA, USA. A neural signature of segregation of tone sequences, independent of the attended stream.
- Billig, A.J.**, & Johnsrude, I.S. (2016). Poster at *Advances and Perspectives in Auditory Neuroscience*, San Diego, CA, USA. Auditory streaming of speech: acoustics, lexicality and neural signatures.
- Billig, A.J.**, Rhone, A.E., Gander, P.E., Nourski, K.V., Wild, C.J., Howard, M.A., Johnsrude, I.S. (2016). Poster at *8th Annual Meeting of the Society for the Neurobiology of Language*, London, UK. Intracranial recordings reveal modulation of high gamma activity in auditory cortex during speech pop-out.
- Carlyon, R.P., Cosentino, S., Deeks, J.M., Guérit, F., **Billig, A.J.**, Parkinson, W., & Bierer, J.A. (2016). Poster at *171st Meeting of the Acoustical Society of America*, Salt Lake City, UT, USA. Limitations on temporal processing by cochlear implant users.
- Billig, A.J.**, Davis, M.H., & Carlyon, R.P. (2014). Poster at *5th Annual Conference of the British Society of Audiology joint with the Experimental and Clinical Short Papers Meetings*, Keele, UK. Effects of attention and intention on auditory streaming.
- Billig, A.J.**, Davis, M.H., & Carlyon, R.P. (2014). Poster at *Workshop and Summer School on Auditory Attention and Scene Analysis*, Delmenhorst, Germany. Effects of lexical knowledge and attention on auditory streaming.

Billig, A.J., Davis, M.H., & Carlyon, R.P. (2014). Poster at *37th Annual Midwinter Meeting of the Association for Research in Otolaryngology*, San Diego, CA, USA. Effects of lexicality and attention on the auditory streaming of speech.

Bierer, J.A., Deeks, J.M., **Billig, A.J.,** & Carlyon, R.P. (2013). Poster at *36th Annual Midwinter Meeting of the Association for Research in Otolaryngology*, Baltimore, MD, USA. Comparison of signal-detection and gap-detection thresholds with focused cochlear implant stimulation.

Billig, A.J. & Müllensiefen, D. (2012). Poster at *12th International Conference on Music Perception and Cognition*, Thessaloniki, Greece. Comparing models of contour in music and speech.

SERVICE, TEACHING, AND PUBLIC ENGAGEMENT

- Ad-hoc reviewing for: Journal of the Acoustical Society of America; Journal of Experimental Psychology: Human Perception and Performance; Journal of Neurophysiology; Hearing Research; Music Perception; Cognitive Neurodynamics; Brain and Language; Cognition; Attention, Perception, & Psychophysics; Neuroimage; eLife; Current Biology; Psychophysiology; Cortex; Progress in Neurobiology; Neural Plasticity
- 2020 Delivered lecture “*Principles and Applications of EEG/MEG/ECoG*” for Birkbeck, University of London Cognitive Neuroscience MSc programme.
- 2020 Reviewed *Centers of Biomedical Research Excellence* project grant application
- 2019 My Twitter summary of our recent article featured as an example of strong public engagement by Journal of Neuroscience
- 2019 Facilitated journal clubs for Sensory Systems, Technologies & Therapies programme, UCL, London, UK
- 2019 Reviewed *Carnegie Trust Incentive Grant* application
- 2019 Gave public lecture on “*The auditory system, age, and experience*” with live musical demonstrations at University of the Third Age, Upminster, UK
- 2019 Served on organizing committee for Basic Auditory Science meeting, UCL, London, UK
- 2019 Assisted on World Hearing Day stand at British Library, London, UK
- 2019 Gave Invited Speaker Lecture, “*What can auditory ambiguity tell us about mind and brain?*”, for Music Mind & Brain MSc, Goldsmiths College, London, UK
- 2018 Facilitated journal clubs for Neuroscience MSc students, UCL, London, UK
- 2018 Marked for Audiology MSc, UCL, London, UK
- 2016 - 2017 Trained and supervised undergraduate research volunteers, University of Western Ontario, London, ON, Canada

- 2016 Reviewed Postdoctoral Collaborative Research Grant applications, University of Western Ontario, London, ON, Canada
- 2016 Gave talk/musical demonstration at Science Showoff public event, London, UK
- 2014 Demonstrated at Cambridge Science Centre public event, Cambridge, UK
- 2014 Delivered science careers talk to high school students, Cambridge, UK
- 2013 – 2015 Served as member of Open Science and IT committees, MRC Cognition and Brain Sciences Unit, Cambridge, UK
- 2013 Delivered seminars on Bayesian Inference, MRC Cognition and Brain Sciences Unit, Cambridge, UK

PROFESSIONAL AFFILIATIONS

- 2016, 2018 - 2019 Society for Neuroscience, postdoctoral member
- 2016 Society for the Neurobiology of Language, postdoctoral member
- 2015 Acoustical Society of America, student member
- 2013 – 2020 Association for Research in Otolaryngology, associate member
- 2012 – 2015 British Society of Audiology, student member

REFEREES

Previous postdoctoral supervisor. Dr. Ingrid Johnsrude, Brain and Mind Institute, University of Western Ontario, Canada. Telephone: +1 519 661 2111 x84447. Email: ijohnsru@uwo.ca

PhD supervisor. Dr. Bob Carlyon, MRC Cognition and Brain Sciences Unit, Cambridge, UK. Telephone: +44 1223 273717. Email: bob.carlyon@mrc-cbu.cam.ac.uk

MSc supervisor. Dr. Daniel Müllensiefen, Goldsmiths College, University of London, UK. Telephone: +44 207 919 7895. Email: d.mullensiefen@gold.ac.uk