

Matthias Heyne

Curriculum Vitae

University of Pittsburgh - School of Health & Rehabilitation Sciences
Department of Communication Sciences & Disorders
5012 Forbes Tower, Pittsburgh, PA 15260
Speech Neural Systems Lab
m.heyne@pitt.edu; +1 617 800 7669
<http://languageandmusic.info>

Research Interests

mechanisms and neural correlates of speech production as investigated using behavioral (acoustic, articulatory: ultrasound, real-time MRI) and neuroimaging methods (structural & diffusion MRI)
secondary interests: parallels of language and music, particularly concerning the shared facial-oral-laryngeal-respiratory system; sociophonetics; New Zealand English

Education & Research Positions

- 2020- Postdoctoral Associate, University of Pittsburgh
Department of Communication Science & Disorders
Speech Neural System Lab
Advisor: Prof. Jason Bohland
- 2020 Class *Organizational Behavior: Leadership & Group Effectiveness*, part of *Leading People in Organizations: Micro-Credential for Postdocs*, Joseph M. Katz Graduate School of Business, University of Pittsburgh
- 2017-2020 Postdoctoral Research Associate, Boston University
Department of Speech, Language, and Hearing Sciences
Speech Neuroscience Laboratory
Advisors: Prof. Frank Guenther & Dr. Jason Tourville
- 2017 Helsinki Summer School, course *Auditory Cognitive Neuroscience*
6 ECTS, August 9 to 18, 2017
- 2016 Ph.D. in Linguistics, University of Canterbury, New Zealand
Dissertation: The influence of First Language on playing brass instruments: An ultrasound study of Tongan and New Zealand trombonists,
Advisors: Dr. Donald Derrick & Prof. Jennifer Hay
- 2012 State Exam "Teaching for secondary schools" (1. Staatsexamen) with the subjects Music and English, University of the Saarland and University of Music Saar, Saarbrücken, Germany
Thesis in English Linguistics: The interaction of musicians in rehearsals
Advisor: Prof. Dr. Neal R. Norrick
- 2012 "Jazz – complementary studies" Trombone (Diplom-Ergänzungsstudiengang Jazz), University of Music Saar
- 2010 Study abroad semester, University of Melbourne, Australia
Linguistics classes taken: Language and Identity
Language in Aboriginal Australia

- 2010 “Orchestral Music” (performance) Bass Trombone (Diplom Orchestermusik), University of Music Saar
- 2004-2007 Studies at the Mannheim University of Music and Performing Arts, Germany, in the courses “Diploma in music teaching” (for music schools) and “Instrumental Performance“ (Bass Trombone)

Peer-reviewed Publications

- Masapollo, M., Segawa, J.A., Beal, D., Tourville, J., Nieto-Castañón, A., **Heyne, M.**, Frankford, S., & Guenther, F.H. (2020). Behavioral and neural correlates of speech motor sequence learning in stuttering and neurotypical speakers: an fMRI investigation. *Neurobiology of Language*. https://doi.org/10.1162/nol_a_00027
- Heyne, M.**, Derrick, D., & Al-Tamimi, J. (2019). Native Language influence on brass instrument performance: An application of Generalized Additive Mixed Models (GAMMs) to midsagittal ultrasound images of the tongue. *Frontiers in Psychology*, 10, 2597. <https://doi.org/10.3389/fpsyg.2019.02597>
- Tourville, J. A., Nieto-Castañón, A., **Heyne, M.**, & Guenther, F. H. (2019). Functional parcellation of the speech production cortex. *Journal of Speech, Language, and Hearing Research* 62(8S): 3055–3070. https://doi.org/10.1044/2019_JSLHR-S-CSMC7-18-0442
- Iltis, P. W., **Heyne, M.**, Frahm, J., Voit, D., Joseph, A., Atlas, L. (2019). Simultaneous dual-plane, real-time magnetic resonance imaging of oral cavity movements in advanced trombone players. *Quantitative Imaging in Medicine and Surgery*. <http://dx.doi.org/10.21037/qims.2019.05.14>
- Heyne, M.**, Wang, X., Derrick, D., Dorreen, K., & Watson, K. (2018). The articulation of /ɹ/ in New Zealand English. *Journal of the International Phonetic Association*. Advance online publication. doi:10.1017/S0025100318000324
- Heyne, M.** & Derrick, D. (2016). Visualization techniques for empirical brass instrument research. *Journal of the International Trumpet Guild* 40(4): 6-14, 24.
- Heyne, M.** & Derrick, D. (2015). Using a radial ultrasound probe’s virtual origin to compute midsagittal smoothing splines in polar coordinates. *Journal of the Acoustical Society of America* 138(6): EL509-514. <http://dx.doi.org/10.1121/1.4937168>

Manuscripts Reviewed/Submitted/In Preparation

- Malloy, J. R., Nistal, D., **Heyne, M.**, Tardif, M. C., & Bohland, J. W. (in preparation). *Delayed auditory feedback elicits specific patterns of serial order errors in speech production.*
- Heyne, M.**, Segawa, J., Beal, D.S., Tourville, J.A., & Guenther, F.H. (in preparation). *White matter structure in the speech network of people who stutter.*
- Al-Tamimi, J., **Heyne, M.**, & Derrick, D. (in preparation). *Accounting for within and between-subject variation using generalized additive mixed models on ultrasound tongue contours.*
- Heyne, M.** & Derrick, D. (in preparation). *Sub-phonemic influences on New Zealand English schwa production.*

Published Conference Proceedings/Abstracts

- Derrick, D., **Heyne, M.**, O'Beirne, G., & Hay, J. (2019). Aero-tactile integration in Mandarin in: *Proceedings of the 19th International Congress of Phonetic Sciences (ICPhS)*. Melbourne, Australia.
- Heyne, M.** & Derrick, D. (2017). An empirical study of native language influence on trombone performance. in: *Abstracts of the International Symposium on Performance Science (ISPS)*, ed. by Williamon, A., and Jónasson, P. Reykjavík, Iceland, Iceland Academy of the Arts. 80-81.
- Heyne, M.**, Gick, B., & Derrick, D. (2017) Transfer of skilled behavior across different vocal tract activities: The influence of speech production on brass instrument performance. *Stem-, Spraak- en Taalpathologie 22*(Supplement): 8.
- Heyne, M.** & Derrick, D. (2015). The influence of tongue position on trombone sound: A likely area of language influence, in: *Proceedings of the 18th International Congress of Phonetic Sciences (ICPhS)*, ed. by the Scottish Consortium for ICPhS 2015. Glasgow, Scotland.
- Heyne, M.** & Derrick, D. (2015). Trombone players seem to use different tongue positions while playing sustained notes, depending on their native languages," in: *Proceedings of the Ninth Triennial Conference of the European Society for the Cognitive Sciences of Music (ESCOM)*, ed. by Ginsborg, J., Lamont, A., Phillips, M., and Bramley, S. Manchester, England.
- Heyne, M.** & Derrick, D. (2014). Some initial findings regarding first language influence on playing brass instruments, in: *Proceedings of the 15th Australasian International Conference on Speech Science and Technology*, ed. by Hay, J. & Parnell, E. Christchurch, New Zealand, Australasian Speech Science and Technology Association (ASSTA). 180-183.

Conference Presentations

- Al-Tamimi, J., **Heyne, M.**, & Derrick, D. (2020). From SS-ANOVA to GAMMs: Accounting for within and between-subject variation using generalized additive mixed models on ultrasound tongue contours. Poster presented at the 12th International Seminar on Speech Production (ISSP 2020). Fully virtual meeting, December 2020.
- Heyne, M.**, Tardif, M. C., Pennetti, V. J., & Bohland, J. W. (2020). Feedback-based alterations of vowel formant production: An analysis of speech produced under delayed auditory feedback. Poster presented at the 12th Annual Meeting of the Society for the Neurobiology of Language (SNL2020). Fully virtual meeting, October 2020.
- Al-Tamimi, J., **Heyne, M.**, & Derrick, D. (2020). Accounting for within and between-subject variation using Generalized Additive Mixed Models: Application on Ultrasound Tongue contours with and without normalization. Talk scheduled to be presented at, however canceled secondary to the COVID19 Pandemic, the 2020 Colloquium of the British Association of Academic Phoneticians (BAAP), University of York, UK, April 2020.
- Heyne, M.**, Segawa, J., Beal, D.S., Tourville, J.A., & Guenther, F.H. (2020). Reduced structural connectivity within the speech motor sequence planning network in persons who stutter. Poster presented at the 2020 Motor Speech Conference, Santa Barbara, CA, February 2020.

- Heyne, M.,** Iltis, P. W., Frahm, J., Voit, D., Joseph, A., & Atlas, L. (2019). Simultaneous dual-plane, real-time magnetic resonance imaging videos of the vocal tract in advanced trombone players show a close coupling of movements measured in different planes. Talk presented at the Biennial Meeting of the Society for Music Perception and Cognition (SMPC), New York University, August 2019.
- Derrick, D., **Heyne, M.,** O'Beirne, G., Hay, J. (2019). Aero-tactile integration in Mandarin. Poster presented at the *19th International Congress of Phonetic Sciences (ICPhS)*. Melbourne, Australia, August 2019.
- Heyne, M.,** Al-Tamimi, J., & Derrick, D. (2019). *Using Generalized Additive (Mixed) Models to uncover novel patterns of speech production and account for unknown by-group variation*. Poster presented at the 2019 Boston Speech Motor Control Symposium, Boston University, June 21, 2019.
- Heyne, M.** (2019). Vocal tract movements during speech production and brass instrument performance: Using ultrasound imaging and real-time MRI to study the transfer of motor memory across vocal tract behaviors and investigate highly-skilled as well as disordered musicians. Talk presented at the *meeting of the Northeast Music Cognition Group (NEMCOG)*, Harvard University, February 2, 2019.
- Heyne, M. & Derrick, D.** (2017). An empirical study of native language influence on trombone performance. Talk presented at the *International Symposium on Performance Science*, Reykjavík, Iceland, August 30 – September 2, 2017.
- Heyne, M.,** Gick, B., & Derrick, D. (2017). Transfer of skilled behavior across different vocal tract activities: The influence of speech production on brass instrument performance. Talk presented at the *7th International Conference on Speech Motor Control*, Groningen, the Netherlands, July 5 - 8, 2017.
- Heyne, M.,** Wang, X., Dorreen, K., Derrick, D., & Watson, K. (2016). The articulation of /ɹ/ in New Zealand English. Poster presented at the *5th Joint meeting of the Acoustical Society of America and the Acoustical Society of Japan*, Honolulu, Hawai'i, November-December 2016.
- Heyne, M.,** Dorreen, K., Wang, X., Derrick, D., & Watson, K. (2016). An ultrasound study of /ɹ/ in New Zealand English. Talk presented at the *Linguistic Society of New Zealand Annual Conference*, Massey University, Wellington, New Zealand, November 2016.
- Heyne, M.,** Derrick, D. (2016). Stylistic variation of sub-phonemic syllabic influences on New Zealand English schwa production. Talk presented at *New Ways of Analyzing Variation (NWAV) 45*, Simon Fraser University, Vancouver, Canada, November 2016.
- Heyne, M.,** Derrick, D. (2016). An articulatory and acoustic study of monophthongs in New Zealand English. Talk presented at the *New Zealand English and English in New Zealand Conference (NZEENZ)*, University of Canterbury, New Zealand, June 2016.
- Heyne, M.,** Derrick, D., & Hay, J. (2015). An ultrasound study of monophthongs in New Zealand English. Talk presented at the *46th Annual Conference of the Australian Linguistic Society*, Western Sydney University, Australia, December 2015.
- Heyne, M.** (2015). The 'singing approach' to brass playing revisited: We sing the language we speak. Talk presented at the *2nd Conference of the Australian Music & Psychology Society*, Western Sydney University, Australia, December 2015.

- Heyne, M.** (2015). An ultrasound study of monophthongs in New Zealand English. Talk presented as part of the *Canterbury Postgraduate Showcase '15*, University of Canterbury, New Zealand, November 2015. (Prize for overall best presentation)
- Heyne, M., & Derrick, D.** (2015). Why expert listeners might be able to distinguish differences in sound produced by brass players from different language backgrounds. Poster presented at the *10th UK Language Variation and Change Conference (UKLVC)*. York, England, September 2015.
- Heyne, M., & Derrick, D.** (2015). Trombone players seem to use different tongue positions while playing sustained notes, depending on their native languages. Poster presented at the *9th Triennial Conference of the European Society for the Cognitive Sciences of Music (ESCOM)*. Manchester, England, August 2015.
- Heyne, M., & Derrick, D.** (2015). The influence of tongue position on trombone sound: A likely area of language influence. Poster presented at the *18th International Congress of Phonetic Sciences*. Glasgow, Scotland, August 2015.
- Heyne, M., & Derrick, D.** (2015). Brass players with different native languages seem to use different tongue positions during playing. Talk presented at *40th Annual Conference of the International Trumpet Guild*, Columbus, OH, May 2015.
- Heyne, M. & Derrick, D.** (2015). Benefits of using polar coordinates for working with ultrasound midsagittal tongue contours. Poster presented at the *169th meeting of the Acoustical Society of America*, Pittsburgh, PA, May 2015.
- Heyne, M. & Derrick, D.** (2014). Some initial findings regarding first language influence on playing brass instruments. Talk presented at the *15th Australasian International Conference on Speech Science and Technology (SST)*, Christchurch, New Zealand, December 2014.

Invited presentations

- Heyne, M.** (2019). *Investigating speech production in populations with normal and disordered speech using Magnetic Resonance Imaging (MRI)*. Talk presented at the Department of Communication Sciences and Disorders, University of Wisconsin-Madison, October 2019.
- Heyne, M.** (2019). *Using magnetic resonance imaging (MRI) to investigate speech production in populations with normal and disordered speech*. Talk presented at the Department of Communication Science and Disorders, University of Pittsburgh, October 2019.
- Heyne, M.** (2019). *Investigating structural connectivity of the speech production network in persons with normal and disordered speech*. Talk presented at the Speech Neurophysiology Lab, University of Michigan, September 2019.
- Heyne, M.** (2019). *Evidence of native language influence on brass instrument performance: Advanced statistics using generalized additive models suggest the transfer of motor memory across different vocal tract activities*. Talk presented at Massachusetts Eye and Ear, Department of Otolaryngology, Harvard Medical School. April 2019.
- Heyne, M.** (2018). *Applications of Magnetic Resonance Imaging (MRI) to the study of speech production*. Talk presented at the NZILBB Seminar Series, University of Canterbury, New Zealand, December 2018.

- Heyne, M.** (2018). *The influence of native language on brass playing: Motor memory from speech production affects midsagittal tongue shape during trombone performance*. Talk presented at the Boston Speech Motor Control Working Group meeting, Boston, MA, January 2018.
- Heyne, M.** (2017). *Transfer of skilled behavior across different vocal tract activities: The influence of speech production on brass instrument performance*. Talk presented at the Speech Neuroscience Laboratory, Boston University, November 2017.
- Heyne, M.** (2017). *The influence of native language on brass playing: Articulatory evidence for the transfer of skilled behavior across different vocal tract activities*. Talk presented at the University of Melbourne Languages and Linguistics Seminar Series, Melbourne, Australia, September 2017.
- Heyne, M.** (2017). *The influence of native language on brass playing: An ultrasound study of Tongan and Kiwi trombone players*. Talk presented at the NZILBB Seminar Series, University of Canterbury, New Zealand, April 2017.
- Heyne, M.** (2016). *The influence of native language on brass playing: An ultrasound study of Tongan and Kiwi trombone players*. Talk presented at the University of British Columbia Department of Linguistics Colloquium Series, Vancouver, Canada, November 2016.
- Heyne, M.** (2016). *Articulatory phonetics & the influence of native language on trombone playing*. Talk presented at the *New Zealand Linguistics Olympiad Finals*, Auckland, New Zealand, April 2016.
- Heyne, M., & Derrick, D.** (2015). *First Language influence on playing brass instruments*. Talk presented at the MARCS Institute for Brain, Behaviour and Development, Western Sydney University, Australia, September 2015.
- Heyne, M., & Derrick, D.** (2015). *Visualization techniques for empirical brass instrument research*. Talk presented at the *ESCOM 2015 pre-conference workshop on Music & Wellbeing*, Royal Northern College of Music, Manchester, England, August 2015.
- Heyne, M., & Derrick, D.** (2015). *The influence of native language on brass playing AND Visualization techniques for empirical brass research*. Talk presented at the Melbourne Conservatorium of Music, University of Melbourne, Australia, August 2015.

Awards and Honours

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| 2016 | Travel award, New Ways of Analyzing Variation (NWAV) conference, Vancouver, CAD\$500 |
| 2015 | Winner of “best overall presentation” for the talk “An ultrasound study of monophthongs in New Zealand English” at the Canterbury Postgraduate Showcase conference, University of Canterbury |
| 2015 | Judge, College of Arts 2015 University of Canterbury Thesis in Three competition |
| 2014 | Winner, College of Arts 2014 University of Canterbury Thesis in Three competition, award NZD1,000 |
| 2012 | University of Canterbury Doctoral Scholarship, NZD20,000 stipend per year + fees |

Research funding awarded

- 2018 Boston University College of Health & Rehabilitation Sciences: Sargent College, travel & accommodation to perform real-time MRI recordings of brass players at the Max-Planck-Institute for Biophysical Chemistry in Göttingen, Germany, US\$1,025
- 2016 School of Language, Social & Political Sciences, University of Canterbury, towards attending *New Ways of Analyzing Variation (N WAV) 45* in Canada, NZD1,500
- 2016 New Zealand Institute of Language Brain & Behaviour (NZILBB), Language Variation and Change theme, collaborative paper challenge 2016
Principal Investigator: The articulation of /r/ in New Zealand English, NZD3,000
- 2015 School of Language, Social & Political Sciences, University of Canterbury, towards attending the *169th meeting of the Acoustical Society of America* and the *40th Annual Conference of the International Trumpet Guild* in the USA, NZD1,500
- 2014 School of Language, Social & Political Sciences, University of Canterbury, for a research trip to Tonga and attendance at the *15th Australasian International Conference on Speech Science and Technology* in Christchurch, NZD1,500

Teaching

- 2020 Guest lecture on “Measuring articulation using real-time MRI of the vocal tract”: Introduction to Research taught by Prof. Jason Bohland, University of Pittsburgh
- 2019 Guest lecture on Somatosensory Feedback Control: SH680 Neural Control of Speech taught by Prof. Frank Guenther, Boston University
- 2017 Substitute Teacher: Linguistics 215 The Sounds of Speech 215 taught by Dr. Kevin Watson, University of Canterbury
- 2017 Tutor/TA: Linguistics/English Language 101 taught by Dr. Kevin Watson & Dr. Heidi Quinn, University of Canterbury
- 2016 Tutor/TA: Linguistics/English Language 101 taught by Dr. Kevin Watson & Dr. Heidi Quinn, University of Canterbury
- 2015 Tutor/TA: Linguistics 103: How to learn another language taught by Prof. Beth Hume, University of Canterbury
- 2014- Exam supervisor, University of Canterbury
- 2012-2013 Substitute teacher, Johannes-Kepler-Gymnasium (High School in Lebach, Germany)
- 2012 Student research assistant and tutor for Prof. Dr. Christian Rolle, Professor for the Pedagogy of Music at the University of Music Saar
- 2009-2010 Teaching assignment for Bass Trombone as a Minor instrument at the University of Music Saar
- 2008-2013 Student research assistant and tutor for Prof. Dr. Neal R. Norrick, Professor for English Linguistics at the University of the Saarland
- 2007-2013 Trombone teacher at a music school in Sankt Wendel, Germany

Fieldwork

- 2014 12-day trip to Tonga (Pacific) to record 10 local trombone players

Technical Skills

Python, R, MATLAB, FSL, Freesurfer, MRTrx, LATEX, Praat, video recording & editing using ffmpeg & the Windows command line, Adobe Premiere Pro

Languages

First Language: German
Speak fluently: English
Basic competence: Spanish, Latin, French
Carried out research on: New Zealand English, Tongan, Japanese

Professional activities

member of the American Speech-Language-Hearing Association (ASHA)

Service to the field

2020 abstract review for the 12th International Seminar on Speech Production (ISSP2020)
2020 grant review for the Canterbury Medical Research Foundation, Christchurch, New Zealand
2019- ad-hoc reviews for Journal of Cognitive Neuroscience, Journal of Fluency Disorders, Journal of Phonetics
2019 Volunteer at the 2019 Boston Symposium on Careers and Collaboration in Science (B-SoCCS)
2019 Presentations on The Human Brain: General introduction with some insights into speech production and parallels of language & music at three Puerto Rican High Schools as part of a concert tour to the island with the MIT Festival Jazz Ensemble and saxophone soloist Miguel Zenón
2018 Co-organizer (as part of the Boston Postdoctoral Association) of the 2018 Boston Symposium on Careers and Collaboration in Science (B-SoCCS)
2018 External examiner for a Master of Science thesis in Communication Disorders, University of Canterbury
2016 Reviewer for the Linguistic Society of New Zealand Annual Conference
2016- Convener of the NZILBB seminar series
2016 Co-editor for a special issue of the New Zealand English Journal on the New Zealand English and English in New Zealand (NZEENZ) Conference, published December 2016
2016 Co-organizer for the NZEENZ Conference, University of Canterbury
2016 Assistant and presenter at the New Zealand Linguistics Olympiad Finals
2016 Pronunciation consultant for the University of Canterbury Chamber Choir
2016 Reviewer for the International Trumpet Guild Conference 2016
2015 Session chair 'Music Training' at the Ninth Triennial Conference of the European Society for the Cognitive Sciences of Music (ESCOM) in Manchester, England
2015 Interview with Radio New Zealand National
<http://www.radionz.co.nz/national/programmes/ourchangingworld/audio/201769396/does-your-first-language-influence-your-trombone-playing>
2013 Assistant for the New Zealand Linguistics Society Conference 2013, University of Canterbury

Musical activities

- 2018-2020 Member of the MIT Festival Jazz Ensemble
- 2018-2019 Member of the MIT Symphony Orchestra
- 2015 Audition for and subsequent trial performances with the Christchurch Symphony Orchestra for their Principal Bass Trombone position
- 2014-2015 Concerts and CD recordings with the Christchurch Symposium Big Band

Other activities

- 2019-2020 MIT outing club: winter and 3-season hiking leader
- 2018-2020 MIT outing club: 3-season hiking leader