Chelsea Chandler

Postdoctoral Researcher in Cognitive Science
chelsea.chandler@colorado.edu

Education

University of Colorado Boulder   2017 - 2022
  Joint Ph.D. in Computer Science and Cognitive Science, Received May 2022   **GPA**: 3.9
  Advisors: Peter W. Foltz and James H. Martin
  M.S. in Computer Science Received May 2020

University of Virginia   2012 - 2016
  Bachelor of Arts in Mathematics and Computer Science, Received May 2016   **GPA** (CS): 4.0

Research Interests

  Natural Language Processing, Machine Learning, Cognitive Science, Mental Health, AI Ethics & Bias

Publications

Peer Reviewed Journal Papers

- Pugh, S.L., **Chandler, C.**, Cohen, A.S., Diaz-Asper, C., Elvevåg, B., Foltz, P.W. (2024) Assessing dimensions of thought disorder with large language models: The tradeoff of accuracy and consistency. *Psychiatry Research.* Volume 341, 116119, ISSN 0165-1781.

- Diaz-Asper, C., **Chandler, C.**, Elvevåg, B. (2024) Cognitive Screening for Mild Cognitive Impairment: Clinician Perspectives on Current Practices and Future Directions. *Journal of Alzheimer's disease.* Volume 99, Number 3, pp. 869-876.

- Pressman, P., **Chandler, C.**, Dino, F., Foltz, P. (2024) Conversational Coherence in Alzheimers Disease and Mild Cognitive Impairment: A Decision Tree Classifier Analysis. *Neurology.* Volume 102, Number 17 supplement 1. pp 3525.

- Diaz-Asper, C., Hauglid, M.K., **Chandler, C.**, Cohen, A.S., Foltz, P.W., Elvevåg, B. (2024) A framework for language technologies in behavioral research and clinical applications: Ethical challenges, implications, and solutions. *American Psychologist*, Volume 79, Number 1, pp 79.

- **Chandler, C.**, Diaz-Asper, C., Turner, R.S., Reynolds, B., Elvevåg, B. (2023) An explainable machine learning model of cognitive decline derived from speech. *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring.* Volume 15, Issue 4.

- Holmlund, T.B., **Chandler, C.**, Foltz, P.W., Diaz-Asper, C., Cohen, A.S., Rodriguez, Z., Elvevåg, B. (2022) Towards a temporospatial framework for measurements of disorganization in speech using semantic vectors. *Schizophrenia Research.*

- Diaz-Asper, C., **Chandler, C.**, Turner, R.S., Reynolds, B., Elvevåg, B. (2022) Increasing access to cognitive screening in the elderly: Applying natural language processing methods to speech collected over the telephone. *Cortex.* Volume 156, pp 26-38.

- Foltz, P.W., **Chandler, C.**, Diaz-Asper, C., Cohen, A.S., Rodriguez, Z., Holmlund, T.B., Elvevåg, B. (2022) Reflections on the nature of measurement in language-based automated assessments of patients' mental state and cognitive function. *Schizophrenia Research.*

- Diaz-Asper, M., Holmlund, T.B., **Chandler, C.**, Diaz-Asper, C., Foltz, P.W., Cohen, A.S., Elvevåg, B. (2022) Using automated syllable counting to detect missing information in speech transcripts from clinical settings. *Psychiatry Research.* Volume 315, 114712.

- Cohen, A.S., Rodriguez, Z., Warren, K.K., Cowan, T.M., Masucci, M.M., Granrud, O, Holmlund, T.B., **Chandler, C.**, Foltz, P.W., and Strauss, G.P. (2022). Natural Language Processing and Psychosis: On The Need for Comprehensive Psychometric Evaluation. *Schizophrenia Bulletin.* Themed Issue: Translating Natural Language Processing (NLP) into mainstream schizophrenia assessment. Volume 48, Issue 5, pp 939948

- **Chandler, C.**, Foltz, P.W., and Elvevåg, B. (2022). Improving the Applicability of AI for Psychiatric Applications through Human-in-the-loop Methodologies. *Schizophrenia Bulletin.* Themed Issue: Translating Natural Language Processing (NLP) into mainstream schizophrenia assessment.

- Diaz-Asper, C., **Chandler, C.**, Turner, S.R., Reynolds, B., and Elvevåg, B. (2021). Acceptability of Collecting Speech Samples from the Elderly via the Telephone. *Digital Health*, Volume 7.

- **Chandler, C.**, Holmlund, T.B., Foltz, P.W., Cohen, A.S., and Elvevåg, B. (2021). Extending the usefulness of the verbal memory test: The promise of machine learning. *Psychiatry Research*, Volume 297, 113743.
- **Chandler, C.**, Foltz, P.W., Cohen, A.S., Holmlund, T.B., Cheng, J., Bernstein, J.C., Rosenfeld, E.P., and Elvevåg, B. (2020). Machine learning for ambulatory applications of neuropsychological testing. *Intelligence-Based Medicine*, Volumes 12, 100006.
- **Chandler, C.**, Foltz, P.W., and Elvevåg, B. (2020). Using Machine Learning in Psychiatry: The Need to Establish a Framework That Nurtures Trustworthiness. *Schizophrenia Bulletin*. Volume 46, Issue 1, pp. 1114.
- Holmlund, T.B., **Chandler, C.**, Foltz, P.W., Cohen, A.S., D., Cheng, J., Bernstein, J., Rosenfeld, E., and Elvevåg, B. (2020). Applying speech technologies to assess verbal memory in patients with serious mental illness. *npj Digital Medicine* 3 (1), 1-8.

Peer Reviewed Conference Papers

- **Chandler, C.**, Breideband, T. Reitman, J.G., Chitwood, M., Bush, J.B., Howard, A., Leonhart, S., Foltz, P.W., Penuel, W.R., D'Mello, S.K. (2024) Computational Modeling of Collaborative Discourse to Enable Feedback and Reflection in Middle School Classrooms. *In Proceedings of the 14th Learning Analytics and Knowledge Conference (LAK '24)*. Association for Computing Machinery, New York, NY, USA, pp 576-586.
- Ganesh, A., **Chandler, C.**, DMello, S., Palmer, M., von der Wense, K. (2024) Prompting as Panacea? A Case Study of In-Context Learning Performance for Qualitative Coding of Classroom Dialog. *In Proceedings of the 17th International Conference on Educational Data Mining.* International Educational Data Mining Society, pp 835-843.
- Breideband, T., Bush, J., **Chandler, C.**, Chang, M., Dickler, R., Foltz, P.W., Ganesh, A., Lieber, R., Penuel, W.R., Reitman, J.G., Weatherley, J., D'Mello, S. (2023) The Community Builder (CoBi): Helping Students to Develop Better Small Group Collaborative Learning Skills. *In Companion Publication of the 2023 Conference on Computer Supported Cooperative Work and Social Computing (CSCW '23 Companion).* Association for Computing Machinery, New York, NY, USA, pp. 376-380.
- **Chandler, C.**, Foltz, P.W., Cohen, A.S., Holmlund, T.B., Elvevåg, B. (2021). Safeguarding against spurious AI-based predictions: The case of automated verbal memory assessment. *NAACL-HLT 2021 Workshop on Computational Linguistics and Clinical Psychology.*
- **Chandler, C.**, Foltz, P.W., Cheng, J., Cohen, A.S., Holmlund, T.B., and Elvevåg, B. (2020). Predicting Self-Reported Affect from Speech Acoustics and Language. In Proceedings of the *LREC 2020 Workshop on: Resources and Processing of Linguistic, Para-linguistic and Extra-linguistic Data from People with Various Forms of Cognitive/Psychiatric/Developmental Impairments (RaPID-3).* pp. 9-14.
- **Chandler, C.**, Foltz, P.W., Cheng, J., Bernstein, J.C., Rosenfeld, E.P., Cohen, A.S, Holmlund, T.B. and Elvevåg, B. (2019). Overcoming the bottleneck in traditional assessments of verbal memory: Modeling human ratings and classifying clinical group membership. In Proceedings of the *NAACL-HLT 2019 Workshop on Computational Linguistics and Clinical Psychology.* pp. 137-147.

WORK HISTORY

University of Colorado Boulder: Postgraduate Employment
Postdoctoral Researcher: Institute for Student-AI Teaming   Fall 2022 - Present

- Developing NLP techniques to identify moments in student speech where additional support could enhance collaboration, enabling targeted assistance and encouragement
- Built RoBERTa and Mistral based NLP models to classify student utterances according to three collaborative learning Community Agreements: being committed to the community, moving thinking forward, and being respectful
- Explored methods to improve the cross-curricular generalizability of Community Agreement classification models
- Designed methods to extract 'noticings' from positive examples of Community Agreements
- Analyzed racial bias in RoBERTa models trained to detect instances of Academically Productive Talk in student speech and developed methods for mitigating such bias

Postdoctoral Researcher: Computer Science   Summer 2022 - Fall 2022
- Developed wordvec.colorado.edu, website offering semantic language comparison tools powered by BERT, Word2Vec, and LSA, with an accessible interface designed for ease of use

University of Colorado Boulder: Graduate Employment
Research Assistant   Summer 2021 - Spring 2022
- Developed an automated tool to flag abusive behavior, protected class discrimination, and signs of self-harm in CU Boulder Faculty Course Questionnaire responses, leveraging advanced NLP and machine learning techniques
- Designed a human-in-the-loop evaluation pipeline that combines machine learning predictions with human expertise for enhanced accuracy and reliability

Graduate Part Time Instructor   Summer 2021
- Introduction to Computing

Teaching Assistant   August 2017 - Spring 2021
- Introduction to Computing (Fall 2017 and Spring 2018), Software Development Methods and Tools (Fall 2018, Spring 2019, and Spring 2020), Graduate Natural Language Processing (Fall 2019), and Senior Capstone Project (Fall 2020, Spring 2021)

Research Assistant   Fall 2019
- Built an API for generating word embedding similarity measures between pieces of text using Python
- Input text was preprocessed, converted to LSA or Word2Vec embeddings, and cosine distances between various segments of the text were generated
- Developed the final user facing website using HTML and JavaScript

Research Assistant   Summer 2018 & 2019
- Collected immediate and delayed verbal recalls to short stories from mentally ill and presumed healthy study participants
- Extracted surface level and semantic features from verbal recalls to build machine learning models for predicting human ratings of recall content and classifying participants as mentally ill or healthy
- Modeled speech and language features to predict self-reports of emotion

Academic Consultant
Computational Psychiatry   April 2019 - Spring 2022
- Developed machine learning models based on natural language and speech features for the remote detection of Mild Cognitive Impairment and Alzheimer's Disease

Education   Summer 2020
- Extracted BERT sentence embeddings of student speech transcripts for use in an AI tutor
- Fine-tuned a pre-trained BERT model for use in a novel AI tutoring system

Lockheed Martin   December 2016 - March 2019
Software Engineer
- Developed an API for running Markov Chain Monte Carlo (MCMC) simulations on financial data using the Python library PyMC3
- Created an AngularJS application for demonstrating the MCMC simulations
- Produced visualizations in Tableau for analyzing financial data and results of MCMC simulations
- Developed a program to assist in the discrete embedding of data in PNG files using Python and Perl
- Researched and reported advanced techniques for detecting malicious JavaScript code

C2 Education   August 2016 - July 2017
Tutor
- Worked with students in a 3:1 setting to improve their math and computer science skills and prepare for standardized tests and college

Center for Open Science   August 2015 - June 2016
Developer Intern
- Conducted research on Elasticsearch database optimizations for the Open Science Framework
- Created widgets using Elasticsearch query results and JavaScript graphing libraries C3 and D3

Research in Industrial Projects for Students (Google LA)   June 2015 - August 2015
Student Researcher and Project Manager

- Developed collaborative filtering models based on the Yelp Challenge Dataset for rating predictions which incorporated matrix factorization, natural language processing, topic modeling, and location
- Presented project findings at the Institute for Pure and Applied Mathematics at UCLA, Google, and the 2016 Joint Mathematics Meetings

Funding and Awards

- Travel award to attend the Human Computer Interaction Consortium Workshop on The Future of Health and Wellness Technologies (2022)
- CU Boulder Computer Science Outstanding Research Award (2021)
- Nelson A. Prager Family and James H. Martin Endowed Graduate Fellowship (2020)
- CU Boulder Summer Research Fellowship for an outstanding Ph.D. TA (2019)
- Travel grant to attend the CRA-W Grad Cohort Workshop for Women (2018 and 2019)
- CU Boulder Computer Science Departmental Fellowship (2017-2018)
- CU Boulder Research Community Development Award (2017)
- Institute of Pure and Applied Mathematics travel grant to present research at Joint Mathematics Meeting in Seattle, WA (2016)
- University of Virginia travel grant to attend Grace Hopper Celebration of Women in Computing (2016)
- University of Virginia Dean's List (2014-2016)

Service

- Reviewer for *ACM Human-Computer Interaction Conference*, *Alzheimer's & Dementia*, *Digital Health*, *NPJ Schizophrenia*, *Psychiatry Research*, and *Schizophrenia Bulletin*
- CU Boulder Ph.D. Student Faculty Search Committee
- CU Boulder Graduate School Peer Mentor
- CU Boulder Computer Science Peer Mentor

Presentations and Media

- Computational Modeling of Collaborative Discourse to Enable Feedback and Reflection in Middle School Classrooms. *Learning Analytics and Knowledge Conference 2024*
- The role of AI and language analysis in mental health assessment *Human Computer Interaction Consortium: The Future of Health and Wellness Technologies*, June 20, 2022.
- Ergodicity in automated mental state assessment: Investigations with data visualization. *Technology, Mind and Society 2021*, American Psychological Association. November 4, 2021.
- Panelist for LSU Science Cafe - The Doctor is In, April 27, 2021.
- Could Artificial Intelligence Help Patients With Schizophrenia? Published on Newsy, December 4, 2019.
- CU Boulder artificial intelligence app could change the way mental illness is diagnosed. Published on Denver7 News, November 13, 2019.
- Overcoming the bottleneck in traditional assessments of verbal memory: Modeling human ratings and classifying clinical group membership at the Sixth Workshop on Computational Linguistics and Clinical Psychology, NAACL-HLT. June 2019.
- Overcoming the bottleneck in traditional assessments of mental health at Colorado Clinical and Translational Sciences Institute CU-CSU Summit. August 2019.
- Machine Learning and Natural Language Processing Approaches to the Automated Assessment of Mental Illness at Computing Research Association Grad Cohort for Women (CRA-W). April 2019 and April 2018.
- Personalized Local Recommendations at Joint Mathematics Meetings. January 2016.

Relevant Skills

Languages: Python, C++, HTML, CSS, JavaScript, LaTeX; Familiarity with MATLAB, R
Libraries: Scikit-learn, Pandas, NumPy, SciPy, Altair, Matplotlib, TensorFlow, PyTorch
Platforms: GitHub, Google Cloud Services; Familiarity with Amazon Web Services