

# Stanford

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## Nicholas Haber

Assistant Professor of Education and, by courtesy, of Computer Science  
Graduate School of Education

 Curriculum Vitae available Online

### CONTACT INFORMATION

- **Admin. Support**

Kirsti Wagner

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### Bio

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#### BIO

Prior to joining the Graduate School of Education, Dr. Nick Haber was a postdoctoral fellow at the Stanford University School of Medicine. His work bridges artificial intelligence, cognitive modeling, and wearable device development. After receiving his PhD in mathematics from Stanford, he launched the Autism Glass Project, developing and testing a computer vision-powered learning tool on Google Glass for children with autism. His recent work includes the design of artificial intelligence systems aimed at increasing our understanding of early childhood learning.

#### ACADEMIC APPOINTMENTS

- Assistant Professor, Graduate School of Education
- Assistant Professor (By courtesy), Computer Science
- Member, Bio-X

#### ADMINISTRATIVE APPOINTMENTS

- Postdoctoral Fellow, Stanford University, (2014-2019)
- Postdoctoral Fellow, McGill University, (2014-2014)
- Postdoctoral Fellow, Mathematical Sciences Research Institute, (2013-2013)
- Graduate Student, Stanford University, (2009-2013)
- Undergraduate Research, Brown University, (2007-2008)
- Undergraduate Research, Brown University, (2006-2007)
- NSF Mathematics REU, Lafayette College, (2005-2005)

#### HONORS AND AWARDS

- Walter V. and Idun Berry Postdoctoral Fellow, Stanford University (2015)
- Magna Cum Laude, Brown University (2008)
- Member, Phi Beta Kappa (2006)

#### BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Chief Scientific Officer, Sension, Inc (2013 - present)

## PROGRAM AFFILIATIONS

- Symbolic Systems Program

## PROFESSIONAL EDUCATION

- Sc.B., Brown University , Mathematics & Economics (2008)
- Ph.D., Stanford University , Mathematics (2013)

## PATENTS

- Nicholas Haber, Catalin Voss. "United States Patent Application 14/275851 Systems and methods for detection of behavior correlated with outside distractions in examinations"
- Nicholas Haber, Catalin Voss. "United States Patent Application 61/821,921 System and Method for Analysis of Visual Viewer Reactions to Video Content. US Application"

## Research & Scholarship

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### RESEARCH INTERESTS

- Brain and Learning Sciences
- Child Development
- Data Sciences
- Early Childhood
- Psychology
- Social and Emotional Learning
- Special Education
- Technology and Education

### CURRENT RESEARCH AND SCHOLARLY INTERESTS

I use AI models of of exploratory and social learning in order to better understand early human learning and development, and conversely, I use our understanding of early human learning to make robust AI models that learn in exploratory and social ways. Based on this, I develop AI-powered learning tools for children, geared in particular towards the education of those with developmental issues such as the Autism Spectrum Disorder and Attention Deficit Hyperactivity Disorder, in the mold of my work on the Autism Glass Project. My formal graduate training in pure mathematics involved extending partial differential equation theory in cases involving the propagation of waves through complex media such as the space around a black hole. Since then, I have transitioned to the use of machine learning in developing both learning tools for children with developmental disorders and AI and cognitive models of learning.

## Teaching

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### COURSES

#### 2019-20

- Curiosity in Artificial Intelligence: EDUC 234 (Spr)

### STANFORD ADVISEES

#### Doctoral Dissertation Reader (AC)

Damian Mrowca

#### Doctoral Dissertation Reader (NonAC)

David Lang

## Publications

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### PUBLICATIONS

- **Toward Continuous Social Phenotyping: Analyzing Gaze Patterns in an Emotion Recognition Task for Children With Autism Through Wearable Smart Glasses.** *Journal of medical Internet research*  
Nag, A., Haber, N., Voss, C., Tamura, S., Daniels, J., Ma, J., Chiang, B., Ramachandran, S., Schwartz, J., Winograd, T., Feinstein, C., Wall, D. P.  
2020; 22 (4): e13810
- **Feature Selection and Dimension Reduction of Social Autism Data.** *Pacific Symposium on Biocomputing. Pacific Symposium on Biocomputing*  
Washington, P., Paskov, K. M., Kalantarian, H., Stockham, N., Voss, C., Kline, A., Patnaik, R., Chrisman, B., Varma, M., Tariq, Q., Dunlap, K., Schwartz, J., Haber, et al  
2020; 25: 707–18
- **Data-Driven Diagnostics and the Potential of Mobile Artificial Intelligence for Digital Therapeutic Phenotyping in Computational Psychiatry.** *Biological psychiatry. Cognitive neuroscience and neuroimaging*  
Washington, P., Park, N., Srivastava, P., Voss, C., Kline, A., Varma, M., Tariq, Q., Kalantarian, H., Schwartz, J., Patnaik, R., Chrisman, B., Stockham, N., Paskov, et al  
2019
- **SUPERPOWER GLASS MOBILE COMPUTING AND COMMUNICATIONS REVIEW**  
Kline, A., Voss, C., Washington, P., Haber, N., Schwartz, J., Tariq, Q., Winograd, T., Feinstein, C., Wall, D. P.  
2019; 23 (2): 35–38
- **Validity of Online Screening for Autism: Crowdsourcing Study Comparing Paid and Unpaid Diagnostic Tasks.** *Journal of medical Internet research*  
Washington, P., Kalantarian, H., Tariq, Q., Schwartz, J., Dunlap, K., Chrisman, B., Varma, M., Ning, M., Kline, A., Stockham, N., Paskov, K., Voss, C., Haber, et al  
2019; 21 (5): e13668
- **Effect of Wearable Digital Intervention for Improving Socialization in Children With Autism Spectrum Disorder A Randomized Clinical Trial** *JAMA PEDIATRICS*  
Voss, C., Schwartz, J., Daniels, J., Kline, A., Haber, N., Washington, P., Tariq, Q., Robinson, T. N., Desai, M., Phillips, J. M., Feinstein, C., Winograd, T., Wall, et al  
2019; 173 (5): 446–54
- **Effect of Wearable Digital Intervention for Improving Socialization in Children With Autism Spectrum Disorder: A Randomized Clinical Trial.** *JAMA pediatrics*  
Voss, C., Schwartz, J., Daniels, J., Kline, A., Haber, N., Washington, P., Tariq, Q., Robinson, T. N., Desai, M., Phillips, J. M., Feinstein, C., Winograd, T., Wall, et al  
2019
- **Addendum to the Acknowledgements: Validity of Online Screening for Autism: Crowdsourcing Study Comparing Paid and Unpaid Diagnostic Tasks.** *Journal of medical Internet research*  
Washington, P., Kalantarian, H., Tariq, Q., Schwartz, J., Dunlap, K., Chrisman, B., Varma, M., Ning, M., Kline, A., Stockham, N., Paskov, K., Voss, C., Haber, et al  
2019; 21 (6): e14950
- **The Potential for Machine Learning-Based Wearables to Improve Socialization in Teenagers and Adults With Autism Spectrum Disorder-Reply.** *JAMA pediatrics*  
Voss, C., Haber, N., Wall, D. P.  
2019
- **Exploratory study examining the at-home feasibility of a wearable tool for social-affective learning in children with autism** *NPJ DIGITAL MEDICINE*  
Daniels, J., Schwartz, J. N., Voss, C., Haber, N., Fazel, A., Kline, A., Washington, P., Feinstein, C., Winograd, T., Wall, D. P.  
2018; 1
- **Feasibility Testing of a Wearable Behavioral Aid for Social Learning in Children with Autism** *APPLIED CLINICAL INFORMATICS*  
Daniels, J., Haber, N., Voss, C., Schwartz, J., Tamura, S., Fazel, A., Kline, A., Washington, P., Phillips, J., Winograd, T., Feinstein, C., Wall, D. P.  
2018; 9 (1): 129–40
- **Learning to Play With Intrinsically-Motivated, Self-Aware Agents**

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Haber, N., Mrowca, D., Wang, S., Li Fei-Fei, Yamins, D. K., Bengio, S., Wallach, H., Larochelle, H., Grauman, K., CesaBianchi, N., Garnett, R.  
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2018

● **Flexible Neural Representation for Physics Prediction**

Mrowca, D., Zhuang, C., Wang, E., Haber, N., Li Fei-Fei, Tenenbaum, J. B., Yamins, D. K., Bengio, S., Wallach, H., Larochelle, H., Grauman, K., CesaBianchi, N., Garnett, R.  
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2018

● **Exploratory study examining the at-home feasibility of a wearable tool for social-affective learning in children with autism.** *NPJ digital medicine*

Daniels, J., Schwartz, J. N., Voss, C., Haber, N., Fazel, A., Kline, A., Washington, P., Feinstein, C., Winograd, T., Wall, D. P.  
2018; 1: 32

● **Sparsifying machine learning models identify stable subsets of predictive features for behavioral detection of autism** *MOLECULAR AUTISM*

Levy, S., Duda, M., Haber, N., Wall, D. P.  
2017; 8: 65

● **Crowdsourced validation of a machine-learning classification system for autism and ADHD.** *Translational psychiatry*

Duda, M., Haber, N., Daniels, J., Wall, D. P.  
2017; 7 (5)

● **The Feynman Propagator on Perturbations of Minkowski Space** *COMMUNICATIONS IN MATHEMATICAL PHYSICS*

Gell-Redman, J., Haber, N., Vasy, A.  
2016; 342 (1): 333-384

● **Use of machine learning for behavioral distinction of autism and ADHD.** *Translational psychiatry*

Duda, M., Ma, R., Haber, N., Wall, D. P.  
2016; 6

● **A Practical Approach to Real-Time Neutral Feature Subtraction for Facial Expression Recognition**

Haber, N., Voss, C., Fazel, A., Winograd, T., Wall, D. P., IEEE  
IEEE.2016

● **Propagation of singularities around a Lagrangian submanifold of radial points** *Bulletin de la SMF*

Haber, N., Vasy, A.  
2015

● **PROPAGATION OF SINGULARITIES AROUND A LAGRANGIAN SUBMANIFOLD OF RADIAL POINTS** *BULLETIN DE LA SOCIETE MATHEMATIQUE DE FRANCE*

Haber, N., Vasy, A.  
2015; 143 (4): 679-726

● **A Normal Form Around a Lagrangian Submanifold of Radial Points** *INTERNATIONAL MATHEMATICS RESEARCH NOTICES*

Haber, N.  
2014: 4804-4821

● **The Feynman propagator on perturbations of minkowski space.** *arXiv.org*

Gell-Redman, J., Haber, N., Vasy, A.  
2014

● **Microlocal analysis of Lagrangian submanifolds of radial points** *Stanford University Thesis*

Haber, N.  
2013

● **Color-Permuting Automorphisms of Cayley Graphs** *Congressus Numerantium*

Albert, M., Bratz, J., Cahn, P., Fargus, T., Haber, N., McMahon, E., Smith, J., Tekansik, S.  
2008; 190: 161-177