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Education

Ph.D. Computer Science, Carnegie Mellon University, August 1989
M.S. Computer Science, Carnegie Mellon University, 1987
B.S. Computer Science & Psychology, Yale University, 1981
Summa cum Laude
Distinction in the Major, Computer Science
Distinction in the Major, Psychology

Professional Experience

Carnegie Mellon University, School of Computer Science **1989-present**
Senior Project Scientist, 2017-Present
Adjunct Professor**,** 2000-2017
Senior Research Computer Scientist, 1998-2000
Research Computer Scientist, 1991-98
Core faculty, Language Technologies Institute, 1996-2000
Core faculty, Computational Linguistics Program, 1995-96
Research Associate, 1989-91

Disney Research **2010-present**
Senior Research Scientist, 2014-2017
Consultant, 2010-2014, 2017-2018, 2023-present

KidAccess, Inc., Owner and Director of Product Development **1998-2021**

Artie, Consultant **2019-2021**

Xandra, Consultant **2019-2020**

American Paleography, Consultant **2019**

Carnegie Learning, Inc., Consultant **2007-2008**

Carnegie Speech, Inc., Consultant **2004-2007**

iCarnegie, Inc., Consultant **2001-2004**

The Rand Corporation, Santa Monica, California **1981-1985**
Consultant, 1982-85
Research programmer, Information Sciences Department, 1981-82

Selected Publications

Books

Lehman, J. F. and Klaw, R., *From Goals to Data and Back Again: Adding Backbone to Developmental Intervention for Children with Autism*, Jessica Kingsley Publishers, London and New York, 2003.

Lehman, J. Fain, *Adaptive Parsing: Self-extending Natural Language Interfaces*, Kluwer Academic Publishers, Norwell, MA, 1992.

Book Chapters

Lehman, J. F., Laird, J. E., and Rosenbloom, P. S., "A Gentle Introduction to Soar, an Architecture for Human Cognition," in *Invitation to Cognitive Science, Volume 4*, S. Sternberg and D. Scarborough, eds., MIT Press, Cambridge, Mass., 1998.

Lehman, J. Fain, Newell, A. N., and Lewis, R. L., "Architectural Influences on Language Comprehension," in *Constraining Cognitive Theories: Issues and Options*, Pylyshyn, Z., ed., Ablex Publishing Corporation, 1998.

Lehman, J. Fain, "Meaning Matters: Response to Miller," in *Mind Matters: A Tribute to Allen Newell*, D. Steier and T. Mitchell, eds., Lawrence Erlbaum Associates, Hillsdale, NJ, 1996.

Lehman, J. Fain, Newell, A. N., Polk, T., and Lewis, R. L., "The Role of Language in Cognition," in C*onceptions of the Human Mind*, Harman, G., ed., Lawrence Erlbaum Associates, Inc., 1993.

Conati C., and Lehman, J. Fain, "EFH-Soar: Modeling Education in Highly Interactive Environments," Advances in Artificial Intelligence, Lecture Notes in Artificial Intelligence, P. Torasso, ed., LNCS 728, Springer-Verlag, 1993.

Lehman, J. Fain, "Three Uses of Adaptive Parsing in Intelligent Tutoring," in *Cognitive Modelling and Interactive Environments in Language Learning*, Engel, F. L, Bouwhuis, D. G., Bosser, T., and d'Ydewalle, G., eds., NATO ASI Series, Springer-Verlag, 1992.

Lehman, J. F., and Carbonell, J. G., "Learning the User's Language: A Step Towards Automated Creation of User Models," in *User Modelling in Dialog Systems*, Wahlster, W., and Kobsa, A., eds., Springer-Verlag, 1989.

Journals

Arakawa, R., Yakura, H., Mollyn, V., Nie. S., Russell, E., Demeo, D., Reddy, H., Maytin, A., Carroll, B., Lehman, J. F., Goel, M., "PrISM-Tracker: A Framework for Multimodal Procedure Tracking using Wearable Sensors and State Transition Information with User-driven Handling of Errors and Uncertainty." Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 2023;6(4):156:1-156:27. doi:10.1145/356950

Naik, A., Lehman, J. F., and Rosé, C., "Adapting to the Long Tail: A Meta-Analysis of Transfer Learning Research for Language Understanding Tasks." Transactions of the Association for Computational Linguistics, Volume 10, August 2022.

Lehman, J. F. and Leite, I., "Turn-taking, Children and the Unpredictability of Fun." AI Magazine, Volume 37, Number 4, Winter 2017.

Israr, A., Zhao, S., Schwalje, K., Klatzsky, R., and Lehman, J. F., "Feel Effects: Enriching Storytelling with Haptic Feedback." ACM Transactions on Applied Perception, Vol. 11, No. 3, Article 11, August 2014.

Carter, E. J., Williams, D. L., Hodgins, J. K., and Lehman J. F., "Are Children with Autism More Responsive to Animated Characters?" Journal of Autism and Developmental Disorders 05/2014; DOI:10.1007/s10803-014-2116-8.

Carter, E.J., Williams, D.L., Minshew, N.J., and Lehman, J.F., "Is He Being Bad? Social and Language Brain Networks during Social Judgment in Children with Autism," PLoS ONE 7(10): e47241. doi:10.1371/journal.pone.0047241.

Lehman, J. F. and Fisher, A., "Dynamic Curriculum Delivery," Community College Journal, April/May 2004.

Green, N. and Lehman, J.F., "An Integrated Discourse Recipe-Based Model for Task-Oriented Dialogue," Discourse Processes, Volume 33, Number 2, 2002.

Miller, C., Lehman J. F., and Koedinger, K., "Goals and Learning in Microworlds," Cognitive Science, Volume 23, Number 3, 1999.

Lehman, J. F., "Toward the Use of Speech and Natural Language Intervention for a Language-disordered Population,"' Behaviour and Information Technology, Volume 18, Number 1, 1999.

Steier, D. M., Lewis, R. L., Lehman, J. Fain, and Zacherl, A. L., "Combining multiple sources of knowledge in an integrated intelligent system," IEEE Expert, Volume 8, Number 3, 1993.

Refereed Conferences, Workshops and Symposia

Rao E.M., Maytin A.K., Reddy, H.A., Russell, E.R., DeMeo, D.P., Goel, M., Lehman, J.F., Carroll, B.T., "Improving Postsurgical Instructions: Findings from the Development of a Digital Assistant for Wound Care," American Association of Dermatology Annual Meeting (Poster), New Orleans, LA, 2023.

Wilkowski, C., Vaccarello, A., Kumar, Y., Reddy, H.A., Maytin, A.K., Russell, E., DeMeo, D., Goel, M., Arakawa, R., Lehman, J., Carroll, B.T.,"Assessing the ease of use of a digital assistant for wound care instruction delivery across patient demographics," First International Societies for Investigative Dermatology Meeting (Poster), Tokyo, Japan, 2023.

Reddy, H., Russell, E., DeMeo, D., Xu, V., Maytin, A., Goel, M., Lehman, J.F., Carroll, B.T., "Patient attitudes towards digital surveillance research after Mohs micrographic surgery," American Academy of Dermatology (Poster), Boston, MA, 2022.

Lovelace, J., Newman-Griffis, D., Vashishth, S., Lehman, J. F., Rosé, C.P., "Robust Knowledge Graph Completion with Stacked Convolutions and a Student Re-Ranking Network," ACL-IJCNLP, 2021.

Newman-Griffis, D., Lehman, J. F., Rosé, C., Hochheiser, H., "Translational NLP: A New Paradigm and General Principles for Natural Language Processing Research," Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL-HLT), 2021.

Naik, A., Lehman, J. F., Rosé, C.P., "Adapting Event Extractors to Medical Data: Bridging the Covariate Shift," 16th Conference of the European Chapter of the Association for Computational Linguistics (EACL), 2021.

Russell, E., DeMeo, D., Reddy, H., Xu, V., Goel, M., Lehman, J., Carroll, B.T., "Patient barriers to performing self-directed post-operative dressing changes after Mohs micrographic surgery" American Society for Dermatologic Surgery (Poster); Chicago, IL, 2021.

Khosla, S., Vashishth, S., Lehman, J. F., Rosé, C.P., "MedFilter: Improving Extraction of Task-relevant Utterances through Integration of Discourse Structure and Ontological Knowledge," Conference on Empirical Methods in Natural Language Processing (EMNLP), 2020.

Paetzel, M., Kennedy, J., Castellano, G., Lehman, J.F., "Incremental Acquisition and Reuse of Multimodal Affective Behaviors in a Conversational Agent." 6th International Conference on Human-Agent Interaction (HAI), 2018.

Mota, P., Paetzel, M., Fox, A., Amini, A., Srinivasan, S., Kennedy, J., Lehman, J. F., "Expressing Coherent Personality with Incremental Acquisition of Multimodal Behaviors." IEEE International Symposium on Robot and Human Interact Communication (RO-MAN), 2018.

Campos, J., Kennedy, J., Lehman, J. F., "Challenges in Exploiting Dialog History with a Robot." International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2018.

Delazio, A., Nakagaki, K., Klatzky, R., Hudson, S., Lehman, J. F., Sample, A., "Force Jacket: Pneumatically-Actuated Jacket for Embodied Haptic Experiences." ACM Special Interest Group on Computer-Human Interaction (CHI), 2018.

Kennedy, J., Leite, I., Pereira, A., Sun, M., Li, B., Jain, R., Cheng, R., Pincus, E. Carter, E., Lehman, J. F., "Learning and Reusing Dialog for Repeated Interactions with a Situated Social Agent." 17th International Conference on Intelligent Virtual Agents (IVA), 2017.

Pereira, A., Carter, E., Leite, I., Mars, J., Lehman, J. F., "Augmented Reality Dialog Interface for Multimodal Teleoperation." IEEE International Symposium on Robot and Human Interact Communication (RO-MAN) 2017.

Sun, M., Leite, I., Lehman, J. F., Li, B., "Collaborative Storytelling between Robot and Child: A Feasibility Study." ACM SIGCHI Interaction Design and Children (IDC), 2017.

Leite, I., Pereira, A., Lehman, J. F., "Persistent Memory in Repeated Child-Robot Conversations." ACM SIGCHI Interaction Design and Children (IDC), 2017.

Sadoughi, N., Pereira, A., Jain, R., Leite, I., and Lehman, J. F., "Creating Prosodic Synchrony for a Robot Co-player in a Speech-controlled Game for Children." 12th ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2017. (Best Paper Award, Technical Advances track; also presented by invitation at Grace Hopper 2018).

Leite, I., Periera, A., Funkhouser, A., Li, A., and Lehman, J. F., "Semi-situated Learning of Verbal and Nonverbal Content for Repeated Human-Robot Interaction." 18th ACM International Conference on Multimodal Interaction (ICMI), 2016.

Lehman, J. F., Wolfe, N., and Pereira, A., "Multi-party Language Interaction in a Fast-paced Game Using Multi-keyword Spotting." 16th International Conference on Intelligent Virtual Agents (IVA), 2016.

Lehman, J. F., Wolfe, N., and Pereira, A., "*G-g-go! Juuump!* Online Performance of a Multi-keyword Spotter in a Real-time Game." 5th Workshop on Child Computer Interaction (WOCCI), 2016.

Fringi, E., Lehman, J. F., and Russell, M., "The Role of Phonological Processes and Acoustic Confusability in Phone Errors in Children's ASR." 5th Workshop on Child Computer Interaction (WOCCI), 2016.

Chaspari, T. and Lehman, J. F., "An Acoustic Analysis of Child-Child and Child-Robot Interactions for Understanding Engagement during Speech-Controlled Computer Games." Interspeech, 2016.

Lehman, J. F. and Singh, R., "Estimation of Children's Physical Characteristics from their Voices." Interspeech, 2016.

Agarwal, P., Al Moubayed, S., Alspach, A., Kim, J., Carter, J., Lehman, J., and Yamane, K., "Imitating Human Movement with Teleoperated Robotic Head." IEEE International Symposium on Robot and Human Interact Communication (RO-MAN, Best Technical Paper Award) 2016.

Leite, I. and Lehman, J. F., "The Robot Who Knew Too Much: Toward Understanding the Privacy/Personalization Trade-off in Child-Robot Conversation." ACM SIGCHI Interaction Design and Children (IDC), 2016.

Chaspari, T., Al Moubayed, S., and Lehman, J. F., "Exploring Children's Verbal and Acoustic Synchrony: Towards Promoting Engagement in Speech-Controlled Robot-Companion Games." 17th ACM International Conference on Multimodal Interaction (ICMI), Workshop on Interpersonal Synchrony, 2015.

Al Moubayed, S. and Lehman, J. F., "Toward Better Understanding of Engagement in Multiparty Spoken Interaction with Children." 17th ACM International Conference on Multimodal Interaction (ICMI), 2015.

Al Moubayed, S. and Lehman, J., "Regulating Turn-taking in Multi-child Spoken Interaction." Interactive Virtual Agents (IVA), 2015.

Fringi, E., Lehman, J. F., and Russell, M., "Analysis of Phone Errors in Computer Recognition of Children's Speech." Workshop on Speech and Language Technology for Education (SLaTE), 2015.

Sundar, H., Lehman, J. F., and Singh, R., "Keyword spotting in multi-player voice driven games for children." Interspeech, 2015.

Fringi, E., Lehman, J. F., and Russell, M., "Evidence of Phonological Processes in Automatic Recognition of Children's Speech." Interspeech, 2015.

Zhao, S., Lehman, J., Israr, A., and Klatzky, R., "Using Haptic Inputs to Enrich Story Listening for Young Children." ACM SIGCHI Interaction Design and Children (IDC), 2015.

Yannier, N., Israr, A., Lehman, J. F. and Klatzky, R., "FeelSleeve: Haptic Feedback to Enhance Early Reading." ACM Special Interest Group on Computer-Human Interaction (CHI), 2015.

Lehman, J. F. and Al Moubayed, S., "Mole Madness—A Multi-Child, Fast-Paced, Speech-Controlled Game." AAAI Spring Symposium on Turn-taking and Coordination in Human-Machine Interaction, 2015.

Al Moubayed, S. and Lehman, J. F., "Design and Architecture of a Robot-Child Speech-Controlled Game," (Late Breaking Report) 10th ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2015.

Baljekar, P., Lehman, J. F., and Singh, R., "Online Word-spotting in Continuous Speech with Recurrent Neural Networks." IEEE Spoken Language Technology Workshop (SLT), 2014.

Lehman, J. F., "Robo Fashion World: A Multimodal Corpus of Multi-child Human-Computer Interaction." 16th ACM International Conference on Multimodal Interaction (ICMI), Workshop on Understanding and Modeling Multiparty, Multimodal Interactions, 2014.

Leite, I., Hajishirzi, H., Andrist, S., and Lehman, J. F., "Managing Chaos: Models of Turn-taking in Character-multichild Interactions." 15th ACM International Conference on Multimodal Interaction (ICMI), 2013.

Andrist, S., Leite, I., and Lehman, J. F., "Fun and Fair: Influencing Turn-taking in a Multi-party Game with a Virtual Agent." Interaction Design and Children (IDC), 2013.

Leite, I., Hajishirzi, H., Andrist, S., and Lehman, J. F. "Take or Wait? Learning Turn-Taking from Multiparty Data." (Late Breaking Report) American Association for Artificial Intelligence (AAAI), 2013.

Williams, D. L., Carter, E. J., and Lehman, J. F., "Visual Strategies to Remember Verbal Information: fMRI Study of Autism," American Speech-Language-Hearing Association (ASHA), 2012.

Hajishirzi, H., Lehman, J. F., and Hodgins, J., "Using Group History to Identify Character-directed Utterances in Multi-child Interactions," 13th Annual SIGdial Meeting on Discourse and Dialog, 2012 (Best Paper Award).

Hajishirzi, H., Lehman, J. F., Kumatani, K., Sigal, L., and Hodgins, J., "Recognizing Character-directed Utterances in Multi-child Interactions," (Late Breaking Report) 7th ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2012.

Williams, D. L., Carter, E. J., Lehman, J. F., and Minshew, N. J., "Making Tough Decisions: The Neural Correlates of Categorization in Children with and without Autism," International Meeting for Autism Research (IMFAR), 2012.

Carter, E. J., Williams, D. L., Lehman, J. F., and Minshew, N. J., "Using Visual Strategies to Remember Verbal Information: an fMRI Study of Working Memory in Children with and without Autism," International Meeting for Autism Research (IMFAR), 2012.

McDonough, J., Kumatani, K., Raj, B., and Lehman, J., "An Information Filter for Voice Prompt Suppression," Asilomar Conference on Signals, Systems, and Computers, 2011.

Slyper, R., Lehman, J., Forlizzi, J., and Hodgins, J., "A Tongue Input Device for Creating Conversations," 24th ACM Symposium on User Interface Software and Technology (UIST), 2011.

Carter, E. J., Williams, D. L., Lehman, J. F., and Minshew, N. J., "Functional Neuroimaging During Social Judgment in Children with Autism," American Speech-Language-Hearing Association, 2011.

Williams, D. L., Carter, E. J., Lehman, J. F., and Minshew, N. J., "Neuroimaging of Inferential and Theory of Mind Processing in Children with Autism," American Speech-Language-Hearing Association (ASHA), 2011.

Kumatani, K., McDonough, J., Lehman, J. F., and Raj, B., "Channel Selection Based on Multichannel Cross-Correlation Coefficients for Distant Speech Recognition," The 3rd Joint Workshop on Hands-free Speech Communication and Microphone Arrays, 2011.

Lehman, J. F., "Hidden Assumptions in the Mainstream Curriculum: K-3 Reading & Writing, Autism Society's 42nd National Conference on Autism Spectrum Disorders, 2011.

Carter, E. J., Williams, D. L., Lehman, J. F., and Minshew, N. J., "Is He Being Bad?: Brain Activation During Social Judgment in Children with Autism," International Meeting for Autism Research (IMFAR), 2011.

Williams, D. L., Carter, E. J., Lehman, J. F., and Minshew, N. J., "Brain Activation During Inferential and Theory of Mind Processing in Children with Autism," International Meeting for Autism Research (IMFAR), 2011.

Alvarez, A., Levin, L., Frederking, R., and Lehman, J. F., "An Assessment of Language Elicitation without the Supervision of a Linguist," 11th Conference on Theoretical and Methodological Issues in Machine Translation (TMI-07), 2007.

Green, N. and Lehman, J. F., "The Role of a Cognitive Agent Architecture in the Design of an Integrated Discourse Processing Model," 6th International Workshop on Agent Theories, Architectures, and Languages (ATAL-99), 1999.

Green, N. and Lehman, J. F., "An Application of Explanation-based Learning to Discourse Generation and Interpretation," AAAI Spring Symposium on Applying Machine Learning to Discourse Processing, 1998.

Lehman, J. F., "Toward the Use of Speech and Natural Language Intervention for a Language-disordered Population," 3rd ACM/SIGCAPH Conference on Assistive Technologies (ASSETS), 1998.

Van Dyke, J. and Lehman, J. F., "A Process Model of Learning Definiteness in a Foreign Language," 19th Annual Conference of the Cognitive Science Society, 1997.

Pelton, G. A. and Lehman, J. F., "Being Effective When Suspending Goals," AAAI Fall Symposium on Plan Execution: Problems and Issues, 1996.

Green, N. and Lehman, J. F., "Comparing Agent Modeling for Language and Action," AAAI Workshop on Agent Modeling, 1996.

Lehman, J. F., Rubinoff, R., and Van Dyke, J., "Natural Language Processing for IFORS: Comprehension and Generation in the Air Combat Domain," 5th Conference on Computer Generated Forces and Behavioral Representation, 1995.

Laird, J. E., Johnson, W. L., Jones, R. M., Koss, F., Lehman, J. F., Nielsen, P. S., Rosenbloom, P. S., Rubinoff, R., Schwamb, K. B., and Tambe, M., "Simulated Intelligent Forces for Air: The Soar/IFOR Project 1995," in 5th Conference on Computer Generated Forces and Behavioral Representation, 1995.

Green, N. and Lehman, J. F., "Goals for Future Computational Models of Conversational Implicature," AAAI Spring Symposium on Computational Implicature, 1996.

Lehman, J. F., Van Dyke, J. and Green, N., "Reactive Natural Language Processing: Comprehension and Generation in the Air Combat Domain," AAAI Fall Symposium on Embodied Language and Action, 1995.

Lehman, J. F., Nelson, G., and Van Dyke, J., "Representation and Acquisition of Lexical Knowledge," AAAI Spring Symposium on Representation and Acquisition of Lexical Knowledge, 1995.

Nelson, G., Lehman, J. F., John, B., "Integrating Cognitive Capabilities in a Real-Time Task," in 16th Annual Conference of the Cognitive Science Society, 1994.

Nelson, G., Lehman, J. F., John, B. E., "Experiences in Interruptible Language Processing," in AAAI Spring Symposium on Active NLP, 1994.

Rubinoff, R. and Lehman, J. F., "Real-time Natural Language Generation in NL-Soar," in 7th International Workshop on Natural Language Generation, 1994.

Lehman, J. Fain, "Toward the Essential Nature of Statistical Knowledge in Sense Resolution," in 12th National Conference on Artificial Intelligence, 1994.

Rosenbloom, P. S., Johnson, W. L., Jones, R. M., Koss, F., Laird, J. E., Lehman, J. F., Rubinoff, R., Schwamb, K. B., and Tambe, M., "Intelligent Automated Agents for Tactical Air Simulation: A Progress Report," in 4th Conference on Computer Generated Forces and Behavioral Representation, 1994.

Rubinoff, R. and Lehman, J. F., "Natural Language Processing in an IFOR Pilot," 4th Conference on Computer Generated Forces and Behavioral Representation 1994.

Rosenbloom, P. S., Lehman, J. F., and Laird, J. E., "Overview of Soar as a unified theory of cognition: Spring 1993," 15th Annual Conference of the Cognitive Science Society, 1993.

Conati C. and Lehman, J. Fain, "Toward a Model of Student Education in Microworlds," 15th Annual Conference of the Cognitive Science Society, 1993.

Lehman, J. Fain, Lewis, R., and Newell, A., "Integrating Knowledge Sources in Language Comprehension," in 13th Annual Conference of the Cognitive Science Society, 1991.

Lewis, R. L., Huffman, S. B., John, B. E., Laird, J. E., Lehman, J. Fain, Newell, A., Rosenbloom, P. S., Simon T., and Tessler, S. G., "Soar as a Unified Theory of Cognition: Spring 1990," 12th Annual Conference of the Cognitive Science Society, 1990.

Lehman, J. Fain, "Supporting Linguistic Consistency and Idiosyncracy with an Adaptive Interface Design," in 12th Annual Conference of the Cognitive Science Society, 1990.

Lehman, J. Fain, "Adaptive Parsing: A General Method for Learning Idiosyncratic Grammars," 6th International Conference on Machine Learning, 1990.

Minton, S. N., Hayes, P. J., and Fain, J. E., "Controlling Search in Flexible Parsing," 9th International Joint Conference on Artificial Intelligence (IJCAI), 1985.

Fain, J., Carbonell, J. G., Hayes, P. J., and Minton, S. N., "MULTIPAR: A Robust Entity-Oriented Parser," 7th Annual Conference of the Cognitive Science Society, 1985.

Patents

US Patent #2022-11416732: Simulated Human-like Affect-driven Behavior by a Virtual Agent, granted August 16, 2022.

US Patent #2022-11,403,556: Automated Determination of Expressions for an Interactive Social Agent, granted August 2, 2022.

US Patent #10,311,863: Classifying Segments of Speech Based on Acoustic Features and Context, granted June 4, 2019.

US Patent #10,269,356: Systems and Methods for Estimating Age of a Speaker Based on Speech, granted April 23, 2019.

US Patent #10,162,815: Dialog Knowledge Acquisition System and Method, granted December 25, 2018.

US Patent #10,019,992: Speech-Controlled Actions Based on Keywords and Context Thereof, granted July 10, 2018.

US Patent #9,588,588: Customized haptic effects, granted March 7, 2017.

US Patent #9,570,069: Sectioned memory networks for on-line word-spotting in continuous speech, granted February 14, 2017.

European Patent Publication #3663986: Simulated Human-like Affect-driven Behavior by a Virtual Agent (published June 2020).