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Areas of expertise: Learning sciences, human factors, research methods

Education

Ph.D., Learning science, human factors psychology | minor: Human-computer interaction **Georgia Tech (2018)**

- **Dissertation**: Wrote a dissertation about my experiments regarding the effects of instructional guidance type ("productive failure" vs. direct instruction), subgoal-labeling, and domain of study on task performance, retention, transfer of learning, and workload
- **CDC immunization schedule redesign**: Led a team of PhD students in a redesign of the CDC's immunization schedule pamphlet driven by human factors and display principles; several recommended redesign elements were implemented in recent editions of the schedule pamphlet, which are currently being used in doctors' offices and are available to the public (also presented at HFES 2018)
- **"Voting System of Tomorrow" competition**: Won a team first-place prize in a 2014 HFES voting process redesign contest; led a team of PhD students during report-writing and ballot design phases and contributed to an associated *Ergonomics in Design* manuscript
- **Usability of work tools**: Recommended tools (e.g., Cisco, Trello) based on classic usability heuristics (*Ergonomics in Design*)
- **Georgia Tech HFES (HFES-GT)**: Served as HFES-GT president in 2015-2016 when chapter won Gold Award (highest distinction)
- **Graduate Student Instructor of the Year**: Won Psychology department award for teaching performance in 2016-2017
- **"Psychology of Magic"**: Performed series of 11 shows around GT and Atlanta to teach psychology principles through card tricks

B.S.E., Industrial and operations engineering | minor: Clarinet performance **Univ. of Michigan (2012)**

- **Medication tray redesign**: Implemented human factors and "lean engineering" principles in a redesign of the crash cart medication trays at the Ann Arbor Veterans Affairs Hospital which increased drug retrieval speed and accuracy; Patent US 20150014492 A1 by Health Care Logistics for "easy-read" vial design, ASHP national Award for Excellence in Medication Safety
- **Michigan Daily**: Wrote columns about current events that won internal awards four times (best opinion piece of the week)

Work experience

Senior cognitive engineer, MITRE (think tank and R&D firm for federal government) **December 2019 – present**

- **Navy Advanced Weapons Elevator (AWE)**: Made recommendations for design of AWE to increase user SA and reduce user error
- **IRS online services**: Improving the online user experience of the Taxpayer Digital Communications (TDC) and Tax Withholding Estimator (TWE) systems and the accessibility of IRS online services generally (users with vision loss, limited English proficiency)
- **COVID-19 vaccine distribution**: Modeling the entities, steps, and performance standards necessary to achieve the Biden White House vision of 100 million Americans vaccinated within 100 days
- **Targeting process (Fires Support Next, ASTARTE)**: Facilitating decision-making and lowering human workload in the targeting process (esp. close air support and airspace deconfliction) via human factors, task analysis, and process modeling
- **UAS Traffic Management (UTM)**: Using process modeling to help the FAA: A) describe the common entities and actions involved in its "Remote ID" initiative for unmanned aerial systems, and B) devise the rules governing these entities and actions
- **Website usability**: Performed surveys, interviews, and heuristic evaluations to improve the usability of the Adaptive Acquisition Framework (AAF) website, which enables defense acquisition personnel to better navigate policies and documents (OUSD project)
- **Effects Chain Analysis Platform**: Wireframing and user workflow design of centralized repository for MITRE analysts and modelers
- **Autonomy Roadmap**: Advising the DoD on technological investments to advance the use of autonomous systems in the U.S. military; focus areas: command and control (C2), common operating picture, automation transparency and trust, streamlined communication

Research scientist, Soar Technology – Intelligent Training division **April 2018 – June 2019**

- **Complex cognitive skills (CCS) research (Army Research Institute, or ARI)**: Created a framework that outlines current CCS research and provides a road map for future CCS research and training; enabled Northrop Grumman, ARI, and military end-users to better select training methods, select skill evaluation techniques, evaluate environmental factors, and navigate team-related concerns
- **Lifelong learning portal (Advanced Distributed Learning Initiative, or ADL)**: Designed user experience and led functional requirements documentation for the production of an online tool that facilitates how military personnel complete their work, track progress on goals, engage in non-work activities, and plan for the future
- **Fishing video game (Naval Air Warfare Center Training Systems Division, or NAWCTSD)**: Designed experimental plan (transparency, speech recognition grammar) and user experience for a game in which players perform tasks (controlling drones to catch fish in a lake) analogous to those required of P-8 anti-submarine warfare instructors (finalist at 2019 I/ITSEC Serious Games Showcase)
- **Social information processing (SIP) in children**: Identified behavioral indications that can improve the accuracy of virtually assessing the SIP skills of children (dwell time, keyboard actions, mouse movements, scenario replaying, changes in selected response)

Selected awards

MITRE Catalyst Award (3x; last: MAY 2022) | James Foley Scholarship (top PhD students at GA Tech in design and tech; finalist, 2017) |

Areas of expertise or competence

Human factors | Learning sciences | Interface design | Research methods | Process modeling | Prototyping processes | Statistical analysis (SPSS, Excel) | Technical writing | Constructivist learning | Survey design | User experience | Sensation and perception | Data visualization | Human-automation interaction | Attention and situation awareness | Human error | Human decision-making processes | Individual differences | Qualitative and quantitative measures | | Workload | User interviews | Task analysis techniques | Accessibility and universal design | Mandarin Chinese spoken fluency | Basic Spanish |

Refereed journal articles

Chen, D., Chase, V., Burkhardt, M., & Agulto, A. (2016). Using industrial engineering and human factors design principles to improve accuracy and speed of drug selection. *Joint Commission Journal of Quality and Patient Safety*, *42* (10), 473-477.

Gable, T.M., **Chen, D.**, Darling, C.M., McGlynn, S., Kazi, S., Preusse, K., Yoo, A., & Schaeffer, L.M. (2016). Recommendations for improving the American voting process through the application of human factors principles. *Ergonomics in Design:The Quarterly of Human Factors Applications*, *24* (3), 4-8.

Goldberg, B., Amburn, C., Ragusa, C., & **Chen, D.** (2017). Modeling Expert Behavior in Support of an Adaptive Psychomotor Training Environment: A Marksmanship Use Case. *International Journal of Artificial Intelligence in Education*, *28* (2), 194-224.

Margulieux, L.E., **Chen, D.**, McDonald, J.D., Bujak, K.R., Gable, T.M., Darling, C.M., Schaeffer, L.M, & Barg-Walkow, L.H. (2016). Online Collaboration Applications Evaluated by Ease of Use. *Ergonomics in Design: The Quarterly of Human Factors Applications*, *24* (2), 21-30.

Refereed conference proceedings

Amburn, C.R., Goldberg, B.S., **Chen, D.**, Ragusa, C., Boyce, M.W., & Shorter, P. (2016). Effects of equipment on model development for adaptive marksmanship trainers. Paper presented at the *Interservice/Industry Training, Simulation, and Education Conference* (I/ITSEC) 2016, Orlando, FL.

Chen, D. & Catrambone, R. (2019). Productive failure and subgoal scaffolding in novel domains. *Proceedings of the 21st International Conference on Human-Computer Interaction*.

Chen, D. & Catrambone, R. (2016). Facilitating spatial task learning in interactive multimedia environments while accounting for individual differences and task difficulty. *Proceedings of the 38th Annual Meeting of the Cognitive Science Society* (pp. 1925-1930). Austin, TX: Cognitive Science Society.

Chen, D. & Catrambone, R. (2015). Paper vs. Screen: Effects on Reading Comprehension, Metacognition, and Reader Behavior. *Proceedings of the 59th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 332-336). Santa Monica, CA: Human Factors and Ergonomics Society. [Best Student Paper, Education Technical Group – HFES 2015]

Chen, D. & Catrambone, R. (2014). Effects of multimedia interactivity on spatial task learning outcomes. *Proceedings of the 58th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 1356-1360). Santa Monica, CA: Human Factors and Ergonomics Society.

Chen, D. & Doescher, C. (2023). Trust issues: Measuring warfighter trust in an airspace deconfliction engine. *Proceedings of the 91st Military Operations Research Society (MORS) Symposium*. Arlington, VA: Military Operations Research Society.

Chen, D., Neville, K.J., Massey, L., Burbelo, G.A., Blankenbeckler, P.N., Normand, S., & Uhl, E. (2019). Toward a definition of complex cognitive skill. *Proceedings of the 63rd Annual Meeting of the Human Factors and Ergonomics Society.*

Chen, D., Schaeffer, L.M., Preusse, K., Gable, T.M., Hartzell, C., McGlynn, S., Yoo, A., Gipson, C., & Kim, D. (2018). Improving the U.S. Adult Immunization Schedule by Applying Usability Principles. *Proceedings of the 62nd Annual Meeting of the Human Factors and Ergonomics Society*. Santa Monica, CA: Human Factors and Ergonomics Society.

Cochran, Z., Tomlinson, B., **Chen, D.**, & Patel, K. (2014). LightWeight: Wearable Resistance Rehab Visualization. *Proceedings of the 27th Annual ACM Symposium on User Interface Software and Technology* (pp. 101-102). New York, NY: Association for Computing Machinery.

Folsom-Kovarik, J.T. & **Chen, D.** (2018). Data Analytics Can Make Existing Web-Delivered Assessments More Informative [Abstract]. *Proceedings of the 59th Annual Meeting of the Psychonomic Society* (p. 64). Madison, WI: Psychonomic Society.

Folsom-Kovarik, J.T., **Chen, D.**, Mostafavi, B., & Brawner, K. (2019). Measuring the complexity of learning content to enable automated comparison, recommendation, and generation. *Proceedings of the 21st International Conference on Human-Computer Interaction*.

Neville, K.J., **Chen, D.**, Massey, L., Cowell, T.S., Burbelo, G.A., Blankenbeckler, P.N., Normand, S., & Uhl, E. (2019, in press). A complex cognitive skills framework. *Proceedings of the 14th International Conference of Naturalistic Decision Making.*

Sollins, B., **Chen, D.**, Reinerman-Jones, L.E., & Tarr, R. (2014). Truck Driving Distractions: Impact on Performance and Physiological Response. *Proceedings of the 58th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 2171-2175). Santa Monica, CA: Human Factors and Ergonomics Society.

Book chapters

Folsom-Kovarik, J.T., **Chen, D.**, Mostafavi, B., & Freed, M. (2019). *Personalization*. In J.J. Vogel-Walcutt (Ed.), *Advanced Distributed Learning – Academy.*

Schaeffer, L.M., Margulieux, L.E., **Chen, D.**, & Catrambone, R. (2016). Feedback via Educational Technology. In L. Lin & R. Atkinson (Eds.), *Educational Technologies: Challenges, Applications, and Learning Outcomes*