Marilyn Hughes Blackmon, Ph.D.

Curriculum Vitae

Institute of Cognitive Science, UCB 344
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Professional Objective

Interdisciplinary research centered in cognitive psychology and spanning human-computer interaction (HCI) of web navigation, Latent Semantic Analysis (LSA), skill acquisition and expert performance, social cognitive neuroscience of engagement/eudaemonia/flow/executive attention, social cognitive neuroscience of empathy/compassion and persistence, cross-cultural psychology, cognitive anthropology.

Education

Ph.D. (1999), University of Colorado, Boulder; Cognitive Psychology; 4.0 GPA

M.A. and all but dissertation (ABD), University of Chicago; Cultural Anthropology; 3.8 GPA

B.A., Michigan State University; Member of the Honors College, graduated "with high honor"

Dissertation

Blackmon, M. H. (1999). *Is a consistent goal structure sufficient to solve difficult unfamiliar problems in a familiar domain? Constraints on teaching for transfer*. Ph.D. dissertation, University of Colorado at Boulder.

Advisory Committee: Peter G. Polson (Chair), Cognitive Psychology; Michael Eisenberg, Computer Science; Walter Kintsch, Cognitive Psychology; Akira Miyake, Cognitive Psychology; Gregory Carey; Department of Psychology

Experience

1999 to present — Research Associate, Institute of Cognitive Science, University of Colorado at Boulder

2005 to 2012 — Lecturer, Department of Psychology and Neuroscience, University of Colorado at Boulder, teaching Psyc 4145/5145, Advanced Cognitive Psychology (dual level: upper-level undergraduates and graduate students, http://autocww2.colorado.edu/~psyc4145 |(password on request).

Memberships in Professional Organizations

American Psychological Society (APS)

American Computing Machinery (ACM)

ACM Special Interest Group on Computer-Human Interaction (SIGCHI)

ACM Special Interest Group on Hypertext/Hypermedia (SIGWEB)

Research Grants

Co-PI, University of Colorado subcontract #03008.40.0483B, with NASA research grant awarded to George Mason University, Mason Fund Number E201301-2, "Automation Interaction Design and Evaluation Methods," period of performance April 1, 2008, to July 9, 2009.

NSF ADVANCE Fellow, NSF/CISE/EIA 01-37759, March 1, 2002 to February 28, 2005

Publications listed in reverse chronological order

Most of the following publications can be downloaded at http://autocww2.colorado.edu/~blackmon/Papers.html.

John, B. E., Swart, C., Bellamy, R. K. E., Blackmon, M. H., & Brown, R. (2013). An open source approach to information scent. *CHI '13 Extended Abstracts on Human Factors in Computing Systems,* 355-360. DOI: 10.1145/2468356.2468419. New York: ACM Press.
[Times cited 11Sep2014 in ACM Digital Library: 0; in Web of Science Cited Reference: 0]

Teo, L.-H., John, B. E., & Blackmon, M. H. (2012). CogTool-Explorer: A model of goal-directed user exploration that considers information layout. *CHI '12 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Austin, TX, USA, May 5-10, 2012), 2479-2488. DOI: 10.1145/2207676.2208414. New York: ACM Press.
[Times cited 11Sep2014 in ACM Digital Library: 7; in Web of Science Cited Reference: 2; Total times cited, eliminating overlap: 8]

Blackmon, M. H. (2012). Information scent determines attention allocation and link selection among multiple information patches on a webpage, *Behaviour & Information Technology, 31* (1), 1-15 (Special Issue: Cognitive Modeling of Web Navigation). DOI: 10.1080/0144929X.2011.599041.
[Times cited 11Sep2014 in Web of Science: 3]

John, B. E., Blackmon, M. H., Polson, P. G., Fennell, K., & Teo, L. H. (2009). Rapid theory prototyping: An example of an aviation task. *Proceedings of the Human Factors and Ergonomics Society the 53rd Annual Meeting, 53* (12): 794-798. DOI: 10.1518/107118109X12524442637624
[Times cited 11Sep2014 in Web of Science Cited Reference: 3]

Hinesley, G. A., & Blackmon, M. H. (2008). The impact of graphics and location expectations on the search for webpage widgets. *Proceedings of the Workshop on Cognition and the Web 2008: Information Processing, Comprehension, and Learning* (pp. 41-48). (WCW2008, Granada, Spain, 24-26 April 2008).
[Times cited 11Sep2014 in Web of Science Cited Reference: 4]

Hinesley, G. A., Blackmon, M. H., & Carnot, M. J. (2008). The importance of graphics: Implications for educational hypertext material. Proceedings of the World Conference on Educational Multimedia, Hypermedia & Telecommunications, ED-MEDIA 2008. Chesapeake, VA: Association for the Advancement of Computing in Education (AACE), CD-ROM, 1412-1421.
[Times cited 11Sep2014 in Web of Science: 0]

Kitajima, M., Polson, P. G., & Blackmon, M. H. (2007). CoLiDeS and SNIF-ACT: Complementary models for searching and sensemaking on the Web. Paper and PowerPoint slides for HCIC 2007 published online at http://www.hcic.org/hcic2007/papers.phtml.
[Times cited 11Sep2014 in Web of Science: 3]

Blackmon, M. H., Mandalia, D. R., Polson, P. G., & Kitajima, M. (2007). Automating usability evaluation: Cognitive Walkthrough for the Web puts LSA to work on real-world HCI design problems. In Landauer, T. K, McNamara, D. S., Dennis, S., & Kintsch, W. (Eds.), *Handbook of Latent Semantic Analysis* (pp. 323-344). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

DOI: 10.4324/9780203936399.ch18
[Times cited 11Sep2014 in Web of Science Cited Reference: 10]

Kitajima, M., Blackmon, M. H., & Polson, P. G. (2005). Cognitive architecture for website design and usability evaluation: Comprehension and information scent in performing by exploration. Session on Cognitive Architectures and HCI. *Proceedings of 11th International Conference on Human-Computer Interaction, HCI-International* 2005 (Las Vegas, NV, July 22–27, 2005, special session organized by Mike Byrne on Cognitive Architectures in HCI, Mahwah, NJ: Lawrence Erlbaum Associates. Volume 4: Theories, models, and processes in HCI, paper 1866).
[Times cited 11Sep2014 in Web of Science: 8]

Blackmon, M. H., Kitajima, M., & Polson, P. G. (2005). Tool for Accurately Predicting Website Navigation Problems, Non-Problems, Problem Severity, and Effectiveness of Repairs. *CHI '05 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 31–40. DOI: 10.1145/1054972.1054978. New York: ACM Press.
[Times cited 11Sep2014 in ACM Digital Library: 33; in Web of Science Cited Reference: 32; Total times cited eliminating overlap: 45]

Blackmon, M. H. (2004). Cognitive Walkthrough. In W. S. Bainbridge (Ed.), *Encyclopedia of Human-Computer Interaction*, 2 volumes (Vol. 1, pp. 104–107). Great Barrington, MA: Berkshire Publishing Group.
[Times cited 11Sep2014 in Web of Science: 2]

Peck, F. A., Bhavnani, S. K., Blackmon, M. H., & Radev, D. R. (2004). Exploring the use of natural language systems for fact identification: Towards the automatic construction of healthcare portals. *Proceedings of the American Society for Information Science and Technology, 41* (1), 327–338. DOI: 10.1002/meet.1450410139.
[Times cited 11Sep2014 in Web of Science: 2]

Blackmon, M. H., Kitajima, M., & Polson, P.G. (2003). Repairing usability problems identified by the Cognitive Walkthrough for the Web. *CHI '03 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 497–504. DOI: 10.1145/642611.642698. New York: ACM Press.
[Times cited 11Sep2014 in ACM Digital Library: 15; in Web of Science Cited Reference: 19; Total times cited eliminating overlap: 28]

Blackmon, M. H., & Polson, P. G. (2003) Applying psychology to design better human-machine systems: Crucial goals for cognitive task analysts. (Book review of *Cognitive Task Analysis*, ed. J. M. Schraagen, S. F. Chipman, & V. L Shalin.) *Contemporary Psychology: APA Review of Books, 48*(4), 468-470.
[Times cited 11Sep2014 in Web of Science: 0]

Blackmon, M. H., & Polson, P. G. (2002). Combining two technologies to improve aviation training design. HCI-Aero 2002 (pp. 24–29). (Paper presented at the HCI-Aero Conference, Cambridge, MA, 23-25 October 2002.) American Association for Artificial Intelligence.
[Times cited 11Sep2014 in Google Scholar: 3]

Blackmon, M. H., Polson, P. G., Kitajima, M., & Lewis, C. (2002). Cognitive Walkthrough for the Web. *CHI '02 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 463–470. DOI: 10.1145/503376.503459. New York: ACM Press.
[Times cited 11Sep2014 in ACM Digital Library: 44; in Web of Science Cited Reference: 41; Total times cited eliminating overlap: 68]

Kitajima, M., Blackmon, M.H., Polson, P.G. & Lewis, C. (2002). AutoCWW: Automated Cognitive Walkthrough for the Web. *Human Interface Symposium 2002* (Human Interface Society, Sapporo,

Japan, September 1-3, 200), 271-274.
[Times cited 11Sep2014 in Web of Science: 0]

McLennan, S., Irving, J. E., Polson, P.G., & Blackmon, M. H. (2002). *Improving training on the glass-cockpit CDU interface*. (NASA Ames Technical Report). Retrieved November 2007 at http://automation.arc.nasa.gov/automation/articles/McLennanIrving.pdf

Kitajima, M., Blackmon, M. H., & Polson, P. G. (2000). A comprehension-based model of web navigation and its application to web usability analysis. In S. McDonald, Y. Waern & G. Cockton (Eds.), *People and Computers XIV - Usability or Else! (Proceedings of HCI 2000,* pp. 357-373). Springer. DOI: 10.1007/978-1-4471-0515-2_24.
[Times cited 11Sep2014 in Web of Science: 9]

Invited Talks

Blackmon, M. H. (2010). *Verifying the psychological validity of LSA semantic spaces used to predict website navigation usability problems.* Invited talk for the Computational Cognitive Modeling of Web Navigation seminar organized by Herre van Oostendorp (Utrecht University, The Netherlands) and Bipin Indurkhya, International Institute of Information Technology, Hyderabad, India), Utrecht University, 20-21 March, 2010.

Conference Presentations: Talks and Posters

Scientific talks at technical conferences

Sherry, L., Medina, M., John, B. E., Teo, L., Blackmon, M. H., Polson, P. G., Feary, M., & Billman, D. (2009). *Automation Interaction Design & Evaluation Methods (AIDEM) program review*. NASA Aviation Safety: 2009 Technical Conference (McLean, VA, Nov. 17-19, 2009).

WCW 2008 (presentation of Hinesley & Blackmon, 2008)

HCIC 2007 (presentation of Kitajima, Polson, & Blackmon, 2007)

HCI 2005 (presentation of Kitajima, Polson, & Blackmon, 2005)

CHI 2005 (presentation of Blackmon, Kitajima, & Polson, 2005)

CHI 2003 (presentation of Blackmon, Kitajima, & Polson, 2003)

CHI 2002 (presentation of Blackmon, Polson, Kitajima, & Lewis, 2002)

Posters

Blackmon, M. H., Polson, P. G., Sherry, L., & Feary, M. (2009, Nov. 17-19). *Building an LSA-simulated representation of pilot aviation knowledge: Accelerating development of NextGen with affordable task analysis tools*. Poster presented at the NASA Aviation Safety 2009 Technical Conference (McLean, VA, Nov. 17-19, 2009).

Blackmon, M. H., Polson, P. G., Sherry, L., & Feary, M. (2008, Oct. 22). *Building an LSA-simulated representation of pilot aviation knowledge: Accelerating development of NextGen with affordable task analysis tools*. Poster presented at the NASA-IIFD Meetings, Denver, CO, October 22, 2008.

Poster on the experimental foundation for the Cognitive Walkthrough for the Web, created for the Triple Festschrift honoring Lyle Bourne, Walter Kintsch, and Thomas K. Landauer, May 2003, University of Colorado at Boulder.

Workshops

Workshop, May 2004, for invited authors of chapters for the book *LSA: A road to meaning.*

CHI 2003 two-day workshop "Designing for Learning" Workshop information available at http://www.sjul.org/learning03/attendees/ (userID learning03, password chilearn). Download my position paper at http://autocww2.colorado.edu/~blackmon/Papers/BlackmonDesignLrng03.pdf.

CHI2002 two-day workshop "Automatically Evaluating the Usability of Web Sites." Workshop information and all position papers available at http://www.usabilityfirst.com/auto-evaluation/position_papers.html.

Research Systems Developed with NSF funding, 2002-2005

Web server at http://autocww2.colorado.edu running Unicode UTF-8

The AutoCWW server incorporates Latent Semantic Analysis in order to perform partially automated Cognitive Walkthrough for the Web (CWW) procedures. CWW is a website usability evaluation method that accurately distinguishes tasks that will encounter usability problems from those that will not, predicting the mean number of total clicks that people will take to accomplish a particular task. ACWW, a highly automated interface available to the public at http://autocww2.colorado.edu/~brownr/ACWW.php, provides the most automated version of the CWW tools, completing the analyses in about one-sixth the time they can be done by an analyst using the original user interface that is still available at http://autocww2.colorado.edu/HomePage.html. The savings in time is even more dramatic when the same webpages and goals must be analyzed two or more times using different parameters. Users can download a tutorial from the same URL to assist them in learning to use ACWW.

The original interface, however, can be accessed using computer-to-computer queries. This has enabled researchers to develop their own computer models and program their computer-based models to query the autocww server over the Internet and obtain LSA cosines and term vector lengths computed for any of the semantic spaces on the autocww.

Web-based experiments run from 1999 to the present are available for study or replication at http://autocww2.colorado.edu/~blackmon/, http://autocww2.colorado.edu/~hinesley/, and http://autocww2.colorado.edu/~toldy/.

Readability Evaluation Tool

- For her MS Thesis project in Computer Science, Dipti Mandalia built and tested a Readability Evaluation Tool as an add-in to Microsoft Word for Windows. The tool fits seamlessly into the workflow of writers using Microsoft Word for Windows to write a document. The functions of the tool appear in the Microsoft Word Tools menu next to Spelling and Grammar. The tool interfaces over the Internet with the AutoCWW.colorado.edu server to perform three functions that improve the readability of the document for a particular audience: (a) monitor percentage of low frequency words at either 3rd-, 6th-, 9th-, or 12th-grade general reading knowledge or college-level general reading knowledge, (b) perform a key concepts check to see how well a particular passage elaborates the key concept or benchmark in terms familiar to the intended audience, and (c) improve local (sentence-to-sentence) coherence to increase readability and learning gains. Anyone can download the tool, manual, and associated papers on the user-centered design, functionality, and evaluation of the tool at http://autocww2.colorado.edu/~blackmon/Readability/ReadabilityTool.html. We made the tool available to a network of interested science writers and medical writers, including writers at Windows to the Universe (http://www.Windows.ucar.edu/), KidsHealth (http://www.kidshealth.org/), and Osteosarcoma Online (http://iucc.iuedu/osteosarcoma/).

Research Systems Developed with NASA Funding, 2008-2009

Web server at http://AviationKnowledge.colorado.edu/ running Unicode UTF-8

Website at http://AviationKnowledge.colorado.edu/~pilotlsa/

This website describes the semantic spaces available on the AviationKnowledge server and includes password-protected webpages for authorized users that define the list of documents that were included in the corpus used to build each of the Latent Semantic Analysis (LSA) semantic spaces that are available for use on the AviationKnowledge server. The ExpertPilot corpus contains a very large collection of documents that pilots are likely to have read during training to be a pilot, containing a total of 44,340 documents containing 68,784 unique terms. The CDUskills corpus, in contrast, contains a small fraction of the documents that are contained in the large Expert Pilot corpus, only those documents that pertain specifically to doing CDU tasks (884 documents containing 4,670 unique terms. Although ExpertPilot has been trained on many more documents about aviation than CDUskills has, the CDUskills semantic space is expected to give finer discrimination of subtle shades of meaning for CDU tasks and provide more accurate predictions of pilot behavior doing CDU tasks than does ExpertPilot.

Website at http://AviationKnowledge.colorado.edu/HomePage.html

This website is being used for computer-to-computer queries by various aviation researchers, http://aviationknowledge.colorado.edu/~pilotlsa/ComputerToComputerQueries.html. The tools give aviation researchers (and the general public) access to Latent Semantic Analysis (LSA) tools to run analyses using the user's choice of CDUskills and ExpertPilot semantic spaces. The available LSA tools include One-to-Many Comparison (a measure of semantic similarity that uses the LSA cosine), word frequency (a measure of the probability that a pilot knows a particular term), low frequency words analysis (when set to a particular threshold frequency, it finds all the words in a passage of text that have a frequency lower than the selected threshold, for example, all the zero-frequency terms or all the terms with a frequency less than 15), term vector length (a measure of concept development and richness based on the amount of closely related information in the semantic space), sentence-to-sentence coherence (uses the LSA cosine measure of semantic similarity), and paragraph-to-paragraph coherence (uses the LSA cosine measure of semantic similarity for each pair of adjacent paragraphs and computes the overall average of the pairs of cosines.

Aviation Cognitive Walkthrough (ACW) at
http://AviationKnowledge.colorado.edu/~mattkoch/ACW.php

Aviation Cognitive Walkthrough (ACW), http://aviationknowledge.colorado.edu/~mattkoch/index.php, runs analyses on a highly automated interface tailored for predicting pilot performance on Control Display Unit (CDU) tasks. The Aviation Cognitive Walkthrough (ACW) automated interface guides the aviation researcher in predicting what action a pilot will take when using the Control Display Unit (CDU) to respond to a clearance from Air Traffic Control. The first two tasks ACW prompts aviation researcher to do are (a) to enter a description of the pilot's goal(s), and (b) to enter the text that appears in each distinct LCD screen display of the Control Display Unit (CDU). The text-entry screens closely resemble the fields of the LCD display grouping and its associated line select keys and scratchpad. The composite LCD screen display is one of four groupings of information on the CDU display and the only one that changes as the pilot completes the CDU task step by step. The other three information groupings within the CDU – mode control keys, function keys, and alphanumeric keys – are already pre-entered for the researcher to save time and effort, because these three information groupings remain the same with each pilot action while the LCD screen display changes with each pilot action. After entering the text for each screen, the researcher is prompted, screen by screen, to specify the correct action for the pilot to take in response to each change in the CDU display screen. ACW will predict whether the pilot is apt to take the correct action or some other, incorrect action instead. At the end of the data entry process, ACW prompts

the researcher to specify the parameters ACW will use for one or more analyses of the data. The last step prompts the researcher to type in his/her email address and push the submit button of the ACW interface. ACW then provides automatic analyses of the information entered and emails the analyses back to the user, predicting the difficulty level for each of the steps in the CDU task. The emailed analyses predict which set of information within the CDU display that the pilot will focus his/her attention on, and which particular action the pilot will probably choose within the grouping. This research tool is being tested to verify that its predictions of task difficulty match data from human pilots on relative difficulty of CDU tasks, and that human pilots' errors on the tasks can be predicted from the ACW task analyses.

Teaching experience

Psyc 4145/5145 Advanced Cognitive Psychology course, University of Colorado at Boulder, Fall 2005 to Spring 2012

I have taught one section of Psyc 4145/5145 every fall and spring semester, starting in Fall 2005 and continuing through Spring 2012. Over the 14 semesters I taught the course it was completed by 518 Psychology and Neuroscience majors and 17 graduate students (11 doctoral, 6 masters in nine different fields of study: Business Administration, Computer Science, Education, Electrical Engineering, Linguistics, Music Education, Political Science, Clinical Psychology, Speech Language & Hearing Sciences).

Faculty course evaluations from Spring 2010 (see image at right from Spring 2010) were the best for the 14 sections I taught, revealing that my Spring 2010 students rated my course significantly higher than other courses in the Department, Division, and Campus. Ratings ranged from 79th to 97th percentile on instructor effectiveness encouraging interest, availability for assistance, intellectual challenge of the course, how much learned in the course, course overall, and instructor overall.

The 3 learning modules below follow the Department's curriculum for lab & method courses and align with the course description: "Advanced course in human cognitive processes. Focuses on attention, pattern recognition, memory, learning, language, visual thought, reasoning, problem solving, and decision-making. Discusses major theories and ideas in terms of the research they have inspired. … One lab per week; research project required."

- **Learning module 1: Hot topics in all areas of cognitive psychology**. The course has six units: (a) Designing an empirical study: Methods and variables, (b) Perception, pattern recognition & imagery, (c) Attention, learning, & memory, (d) Language, multimedia, & culturally meaningful concepts, (e) Judgment and decision-making, and (f) Evidence-based practice, visual & verbal reasoning, problem-solving, creativity, and discovery. Students learn to read empirical studies and review articles in professional psychology journals.
- **Learning module 2: Become a wise consumer of scientific psychology research**. All of us — professional researchers included — need to become wise consumers of scientific

Item No.	Your rating Avg.	Median	Diff from Dept	Div	Campus	Percentile in Dept	Div	Campus
2 Personal interest before enrolled	4.5	5.0	0	0	0	43	48	52
3 Instr effectiveness encouraging interest	5.7	6.0	++	++	++	91	91	88
4 Instr availability for assistance	5.8	6.0	++	++	++	97	94	91
5 Intellectual challenge of course	5.3	5.0	++	+	++	92	84	89
6 How much you learned in course	5.5	6.0	+	+	++	83	83	85
7 Course overall	5.5	6.0	+	++	+	83	86	85
8 Instructor overall	5.7	6.0	+	+	+	80	82	79
9 Instr respect/professional treatment	5.9	6.0	+	0	+	69	66	68
1 Hrs/week spent on course (incl class)	10-12	10-12	+++	++	++	95	90	87
Hrs/week scale: 0-3=1, 4-6=2, 7-9=3, 10-12=4, 13-15=5, 16+=6								

psychological research and to do evidence-based practice (scientist-practitioner model) in our careers, so we must learn to discern practices whose effectiveness is well supported by scientific evidence. To earn an A in the course students must write three different types of scientific essays, requiring them to use Web of Science, comprehend articles from professional journal articles, and understand meta-analyses. As a result they become more astute consumers of research and lay the foundations for evidence-based practice as professional psychologists or as members of other professions that benefit from applications of cognitive psychology research, such as medicine, business, education, information sciences, and clinical/counseling psychology.

- **Learning module 3: Semester-long lab project.** It is important for students to design, conduct, and report an original experiment at least once in their undergraduate years, helping them understand how psychology research is done and contributing to making them wise consumers of scientific research. Students complete a literature review using electronic databases (primarily Web of Science) to find an original research topic, design and conduct a real psychology experiment, analyze the data using statistical analysis software, discover the most effective way to present the results in graphs and tables, write up the results to meet the standards for submission of experimental reports to a professional psychology journal, and prepare and present a scientific talk. Students optionally prepare a scientific poster using PowerPoint, which can be attached to a graduate school application, resume, or recommendation letter.

Psyc 4145 student posters sponsored for Annual Department of Psychology and Neuroscience Undergraduate Research Day, University of Colorado at Boulder

Out of the 518 undergraduates who completed my Psyc 4145 course from Fall 2005 to Spring 2012, a total of 134 (26%) voluntarily chose to create and exhibit a poster about their semester-long Psyc 4145 research and participate in the annual Department of Psychology and Neuroscience Undergraduate Research Day in 2006-2010 —an unusually high participation rate that indicates how successful the course is in encouraging interest in research and promoting mastery of research skills. Students receive no course credit for participating, but they do receive course credit for creating the optional poster, whether or not they choose to also exhibit the poster at Undergraduate Research Day.

In addition, students from my class exhibited a total of 82 posters out of the total 315 posters exhibited at the last six annual Undergraduate Research Day events, 2007 to 2012 — a disproportionately high 26% of all the posters exhibited by undergraduates guided by all members of the Psychology & Neuroscience Department and a few other departments that contribute participants to this scientific poster event intended to encourage undergraduate research.

Recommendation letters written for former students

I have written over 350 recommendation letters for former students who completed Psych 4145 or Psyc 5145. For example, during the academic year 2011-2012 I wrote 83 letters for 18 different students. These letters have helped students obtain admission to graduate school programs, receive scholarships or graduate fellowships, or find internships or employment. In addition, I have spent many hours counseling students about their future careers, teaching them about how to apply for graduate programs, and helping them refine personal statements, research posters, and resumes.

Experience Supervising PhD, Master's and Senior Honor's Theses and Independent Study Projects

I have had the pleasure of co-supervising individual graduate and undergraduate students in Computer Science and Cognitive Psychology, teaching them research skills and coaching them on their research projects, Master's theses or PhD dissertations. They are listed in reverse chronological order below:

2012 to 2015 — Dissertation advisory committee member for Steven Parker, Ph.D. candidate, Music Education, College of Music, and candidate for joint Ph.D. in Cognitive Science, Institute of Cognitive Science.

2010 to 2011 — M.S. thesis committee member for Bryan McNair, M.S., Department of Biostatistics, University of Colorado Denver, thesis titled *Surf-ival analysis: Mixed discrete survival models in website usability analysis*. Bryan McNair successfully defended his M.S. thesis in November 2011 and received his M.S. in December 2011.

Fall 2010 — Christopher Owens Hamill, M.A. candidate in the Department of Linguistics, independent study comparing the effects on semantic meaning and long-term retention of (a) implicitly learning new vocabulary from the surrounding context, compared to (b) explicitly learning new vocabulary by studying the meaning associated with the vocabulary.

Spring 2010 — Benjamin Stone, Ph.D. University of Adelaide, Australia. Served by invitation on the examining committee for Ben Stone's dissertation, *The development and assessment of the Semantic Fields model of visual salience*, which resulted in Ben Stone being awarded his PhD degree from the School of Psychology, May 2010, University of Adelaide, Australia.

Spring 2010 — Chao Wang, Ph.D. candidate, School of Education, University of Colorado Boulder, supervised independent study on cross-cultural differences in the effects of graphical devices in illustrations used in international science tests.

2004 to 2009 — Margaret E. Toldy, Ph.D. Cognitive Psychology, August 2009. Served on dissertation advisory committee and was co-advisor for her dissertation on searching for information in complex informational websites, investigating interventions designed to reduce the number of wasted clicks made on previously visited links during difficult search tasks, and determining the extent to which such interventions improve overall success rate for search tasks, toldyme@aol.com, http://autocww2.Colorado.edu/~toldy4

Fall 2005 — Mathew R. Arnold, independent study using Csikszentmihalyi's Experience Sampling Method to study serious athletes' motivation and absorbing interest during sports performance

2004 to 2005 — Richard Brown, M.S. in Computer Science, University of North Florida; helped with M.S. thesis on building more automated interface for the Cognitive Walkthrough for the Web; http://autocww2.colorado.edu/~brownr

2003 to 2005 — Gail A. Hinesley, Ph.D. Candidate, Cognitive Psychology, Ph.D. 2005; served on dissertation advisory committee and was co-advisor for her dissertation on how distinctive graphical patterns and location expectations influence search for information on websites, ghinesley@csc.edu, http://autocww2.colorado.edu/~hinesley

2002 to 2004 — Dipti R. Mandalia, M.S. Department of Computer Science; served on Master's thesis advisory committee for a thesis on "User-Centered Design of a Content Analysis Tool for Domain Experts," diptimandalia@yahoo.com, http://autocww2.colorado.edu/%7Edipti/ExptChi/WelcomePage.html; http://autocww2.colorado.edu/~blackmon/Readability/ReadabilityTool.html

2003 — Rizwan Ansary, Ram Kailasan, and Naim Al Khatib, a team of Computer Science graduate students doing a user-interface design project, "Design of a Universally Usable Informational Website," http://autocww2.colorado.edu/~blackmon/Papers/UniversallyUsableWebsites.html

2003 to 2004 — Bryan McNair, EPO Biology and Psychology double major, Research Assistant in AutoCWW research program, currently Bryan.Mcnair@ucdenver.edu

2000 to 2001 — Paige E. Gamble, served on Senior Honor's Thesis committee, Department of Psychology, summa cum laude; http://autocww2.colorado.edu/~blackmon/PaigeHome.html

Honors and Awards: Teaching

Who's Who Among America's Teachers Award, Academic year 2006-2007

Evidence-based practice in undergraduate education

My long-term goal as a teacher is to apply cognitive psychology research to the real-world task of maximizing student learning, using an iterative process of course design. To design a course I draw on the large body of cognitive psychology research findings relevant to education. Cognitive psychology research on skill acquisition and transfer has demonstrated that learners acquire procedural knowledge (skills) by solving problems and by deliberate practice, and that transfer is enhanced by building the procedural knowledge from a deeper conceptual understanding. Cognitive psychology research on declarative knowledge (episodic and semantic memory for concepts and facts) shows that learners acquire more durable, retrievable declarative knowledge by test-enhanced learning effects. Instead of just absorbing new verbal and perceptual information by reading, listening, or observing, students need to lay down retrieval paths to that information via test-enhanced learning, drawing inferences, and solving problems. From 2005 to 2012 I used test-enhanced learning by implementing clicker response technology and developed short-answer questions to prepare students for in-class multiple-choice clicker questions.

Another important guideline for learning is to ask deep explanatory questions. I created a large number of essay questions for four types of essays: (a) using Web of Science to research about a psychology researcher mentioned in a popular-media news clipping or webpage, (b) citing six professional journal articles to construct a well-argued answer to a research question of theoretical importance, (c) citing six professional journal articles to take a position on a practical question of real-world importance, and (d) show evidence-based practice skills by citing evidence from meta-analyses of controlled laboratory experiments and/or randomized controlled trials about a single question, such as whether mindfulness-based stress reduction really works and, if so, by what mechanisms.

Computer Skills and Languages

Computer Skills

Operating systems: Mac OS, Windows, UNIX, Linux.

System administration skills for Red Hat Linux on autocww2.colorado.edu server

Microsoft Office

StatView and R statistical analysis software packages

HTML, BBEdit, Adobe Dreamweaver CS6 (see website I designed, built, and maintain at http://www.AmerLandscape.com, as well as an extensive course website for Advanced Cognitive Psychology 4145/5145 maintained at http://autocww2.colorado.edu/~psyc4145/ and many web-based experiment sites at http://autocww2.colorado.edu/~blackmon)

Adobe Photoshop CS6

Foreign Languages

Passed University of Chicago Graduate School tests for competency reading French and German

Professional and Community Service

Peer Reviews of Submitted Papers Requested by, and Completed for, Editors of Professional Journals or Paper Chairs of Professional Conferences

- *ACM Transactions on Computer–Human Interaction (TOCHI)*

- *Behaviour & Information Technology*
- *Cognitive Science*
- *Human-Computer Interaction*
- *International Journal of Human-Computer Studies*
- *IEEE Internet Computing*
- *User Modeling and User-Adaptive Interfaces (UMUAI)*
- CHI 2005, CHI2006, CHI2007, CHI2008, CHI2009, CHI 2011 peer reviewer for full papers

School District and Community Outreach

Note: after the birth of my second child I took a leave of absence from my Ph.D. graduate work and applied my cognitive psychology knowledge for the common good through various activities:

(1982-1994) Applied cognitive psychology research findings to create highly successful sets of instructional materials to meet K-12 teachers' goals for improving students' math, spatial, and scientific problem solving skills. This included materials for teaching word math problems, mastering Soma cube three-dimensional spatial puzzles, mastering tangrams (two-dimensional spatial puzzles), and learning how to design simple but genuine science experiments for science fair projects.

(1991-1997) Published three long feature articles in *Sunday Camera*, Boulder, CO that apply cognitive psychology findings and theory to local educational practice and policy making: "Breaking the Bell-Curve Barrier," "The Writing Problem: Can Boulder Valley Solve It?" and "Schools in Decline."

(1992-1996) Catalyst responsible for establishing the International Baccalaureate (IB) Program in Boulder, and for creating a self-selecting admissions program that encourages participation by ethnic minority students. Defended the program against critics using Anders Ericsson's (1993, 1994) papers that document the crucial causative effect of accumulated deliberate practice on the acquisition of expertise, undermining the theory that inherited talent is a necessary prerequisite for expertise. In addition to serving on the IB Steering Committee from 1992-1996, I was the organizer and first-serving Chair of the IB Multicultural Diversity Committee for recruiting ethnic minority students into the IB program.

References

1. Peter G. Polson, Ph.D., Professor Emeritus, Department of Psychology and Neuroscience, and Retired Fellow, Institute of Cognitive Science; University of Colorado at Boulder, Peter.Polson@Colorado.EDU, 303-818-3400 (cell); CHI Academy, http://sigchi.org/documents/awards/awards-2003.html#peterpolson.
2. Bonnie E. John, Ph.D., IBM Research, 1101 Kitchawan Rd., Yorktown Heights, NY 10598, bejohn@us.ibm.com.
3. Clayton H. Lewis, Ph.D., Professor of Computer Science and Fellow, Institute of Cognitive Science; University of Colorado, Boulder, CO 80309-0430, 303-492-6657, clayton@cs.colorado.edu, http://www.cs.colorado.edu/people/clayton_lewis.html.
4. Muneo Kitajima, Ph.D., Leader, Human Computer Interaction Program, National Institute of Advanced Industrial Science and Technology, 1-1-1, Higashi, Tsukuba, Ibaraki 305-8566 Japan, +81 29 861 6650, kitajima@ni.aist.go.jp, http://staff.aist.go.jp/kitajima.muneo/.