

# Ryan Shaun Joazeiro de Baker

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## RESEARCH INTERESTS

Human-Computer Interaction, Educational Data Mining, Intelligent Tutoring Systems, Machine Learning, Interaction Design, Learning Sciences, Learner-Computer Interaction, Gaming the System, Quantitative Field Observation, Motivational and Cognitive Modeling

## EDUCATION

**Ph. D.** Human-Computer Interaction. Carnegie Mellon University. Conferred on December 22, 2005. Advisors: Kenneth R. Koedinger, Albert T. Corbett

**M.S.** Human-Computer Interaction. Carnegie Mellon University. Conferred August 9, 2005.

**ScB.** Computer Science. Brown University. Graduated with Honors in Computer Science, May 2000.

## PROFESSIONAL EXPERIENCE

**Research Fellow.** Learning Sciences Research Institute. University of Nottingham. Spring 2006 – Present.

**Post Doctoral Fellow.** Human-Computer Interaction Institute. Carnegie Mellon University. Winter 2006.

**Graduate Research Assistant/ Graduate Fellow.** Human-Computer Interaction Institute. Carnegie Mellon University. Advisors: Kenneth R. Koedinger, Albert T. Corbett. Fall 2000 – Fall 2005.

**Undergraduate Research Assistant.** JDSL (Data Structures Library in JAVA) Project. Computer Science Department. Brown University. Advisor: Roberto Tamassia. Summer 1997 – Spring 2000.

**Research Assistant.** LARC (LABoratory for Recreational Computing) Games Lab. Computer Science Department. University of North Texas. Advisor: Ian Parberry. Summer 1995– Spring 1996.

**Educational Software Developer.** Office of Education. Superconducting Super Collider Laboratory. Managers: Sam Kivlighn, Tom Gadsden. Summer 1992– Spring 1994.

## **TEACHING EXPERIENCE**

**Course Designer and Instructor.** Proposed to faculty committee, designed, and taught a new course in Human-Computer Interaction for Computer Scientists, along with Kenneth R. Koedinger, Jacob Wobbrock, and A. Fleming Seay. Human-Computer Interaction Institute, Carnegie Mellon University. Spring 2004.

**Teaching Fellow.** Learning and Technology. Module Convenor Claire O'Malley. Learning Sciences Research Institute, University of Nottingham. Spring 2007.

**Teaching Assistant.** Cognitive Modeling and Intelligent Tutoring Systems, Professor Kenneth R. Koedinger. Human-Computer Interaction Institute, Carnegie Mellon University. Spring 2001.

**Teaching Assistant.** Advanced Algorithms, Professor Franco Preparata. Department of Computer Science, Brown University. Fall 1999.

**Head Teaching Assistant.** Data Structures and Algorithms, Professor Roberto Tamassia. Department of Computer Science, Brown University. Spring 1999.

**Teaching Assistant.** Data Structures and Algorithms, Professor Roberto Tamassia. Department of Computer Science, Brown University. Spring 1998.

**Teaching Assistant.** Intensive Algebra II Course. Intensive Mathematics Institute, Denton, TX. Summer 1996.

**Student Advised.** Brian Thompson (B.S. student in Computer Science at Carnegie Mellon University). Summer research project; co-advised with Albert Corbett.

**Guest Lecturer.** Information and Communication Technologies in Education. Module Convenor Charles Crook. Learning Sciences Research Institute, University of Nottingham. Fall 2006.

**Guest Lecturer.** Information and Communication Technologies in Education. Module Convenor Charles Crook. Learning Sciences Research Institute, University of Nottingham. Spring 2006.

**Guest Lecturer.** Telepresence Applications. Professor Peter Coppin. Robotics Institute, Carnegie Mellon University. Fall 2003.

**Guest Lecturer.** Data Structures and Algorithms, Professor Roberto Tamassia. Department of Computer Science, Brown University. Spring 2000.

**Volunteer Tutor.** Washington Polytechnic Academy, Pittsburgh, PA. 2000-2001.

## **PUBLICATIONS**

### **Refereed Journal Papers**

Baker, R.S.J.d., Walonoski, J.A., Heffernan, N.T., Roll, I., Corbett, A.T., Koedinger, K.R. (to appear) Why Students Engage in “Gaming the System” Behavior in Interactive Learning Environments. To appear in *Journal of Interactive Learning Research*.

Baker, R.S., Corbett, A.T., Koedinger, K.R. (2006) Responding to Problem Behaviors in Cognitive Tutors: Towards Educational Systems Which Support All Students. *National Association for the Dually Diagnosed (NADD) Bulletin*, 9 (4), 70-75.

Tamassia R., Goodrich M.T., Vismara L., Handy M., Cohen R., Hudson B., Baker, R.S., Gelfand, N., Shubina G., Brandes U. (2001) JDSL: The Data Structures Library in Java. *Dr. Dobb's Journal and Sourcebook*, April 2001, 21-33.

### **Journal Manuscripts In Review Process**

Baker, R.S.J.d., Corbett, A.T., Koedinger, K.R. (Under Review) The Difficulty Factors Approach to the Design of Intelligent Tutoring Systems.

Baker, R.S.J.d., Corbett, A.T., Roll, I., Koedinger, K.R. (Under Revision) Developing a Generalizable Detector to Detect When Students Game the System.

Baker, R.S.J.d., Corbett, A.T., Roll, I., Wagner, A.Z., Koedinger, K.R. (Under Revision) The Relationship Between Gaming the System and Learning in Cognitive Tutor Classrooms.

### **Refereed Conference Full Papers**

Baker, R.S.J.d., Habgood, M.P.J., Ainsworth, S.E., Corbett, A.T. (in press) Modeling the Acquisition of Fluent Skill in Educational Action Games. To appear in *Proceedings of User Modeling 2007*.

Baker, R.S.J.d. (in press) Modeling and Understanding Students' Off-Task Behavior in Intelligent Tutoring Systems. To appear in *Proceedings of ACM CHI 2007: Computer-Human Interaction*.

Rodrigo, M.M.T., Baker, R.S.J.d., Lagud, M.C.V., Lim, S.A.L., Macapanpan, A.F., Pascua, S.A.M.S., Santillano, J.Q., Sevilla, L.R.S., Sugay, J.O., Tep, S., Viehland, N.J.B. (in press) Affect and Usage Choices in Simulation Problem Solving Environments. To appear in *Proceedings of Artificial Intelligence in Education 2007*.

Baker, R.S.J.d., Corbett, A.T., Koedinger, K.R., Evenson, E., Roll, I., Wagner, A.Z., Naim, M., Raspat, J., Baker, D.J., Beck, J. (2006) Adapting to When Students Game an Intelligent Tutoring System. *Proceedings of the 8<sup>th</sup> International Conference on Intelligent Tutoring Systems*, 392-401. **[Won Best Paper Award]**

Baker, R.S.J.d., Corbett, A.T., Koedinger, K.R., Roll, I. (2006) Generalizing Detection of Gaming the System Across a Tutoring Curriculum. *Proceedings of the 8<sup>th</sup> International Conference on Intelligent Tutoring Systems* , 402-411.

Roll, I., Aleven, V., McLaren, B.M., Ryu, E., Baker, R.S.J.d., Koedinger, K.R. (2006) The Help Tutor: Does Metacognitive Feedback Improve Students' Help-Seeking Actions, Skills, and Learning? *Proceedings of the 8<sup>th</sup> International Conference on Intelligent Tutoring Systems* , 360-369.

Baker, R.S., Roll, I., Corbett, A.T., Koedinger, K.R. (2005) Do Performance Goals Lead Students to Game the System? *Proceedings of the International Conference on Artificial Intelligence and Education (AIED2005)*, 57-64.

Fogarty, J., Baker, R., Hudson, S. (2005) Case Studies in the use of ROC Curve Analysis for Sensor-Based Estimates in Human Computer Interaction. *Proceedings of Graphics Interface (GI 2005)*, 129-136.

Roll, R., Baker, R., Aleven, V., McLaren, B., Koedinger, K. (2005) Modeling Students' Metacognitive Errors in Two Intelligent Tutoring Systems. *Proceedings of User Modeling 2005*, 367-376.

Baker, R.S., Corbett, A.T., Koedinger, K.R. (2004) Detecting Student Misuse of Intelligent Tutoring Systems. *Proceedings of the 7th International Conference on Intelligent Tutoring Systems*, 531-540.

Baker, R.S., Corbett, A.T., Koedinger, K.R. (2004) Learning to Distinguish Between Representations of Data: a Cognitive Tutor That Uses Contrasting Cases. *Proceedings of the International Conference of the Learning Sciences*, 58-65.

Baker, R.S., Corbett, A.T., Koedinger, K.R., Wagner, A.Z. (2004) Off-Task Behavior in the Cognitive Tutor Classroom: When Students "Game The System". *Proceedings of ACM CHI 2004: Computer-Human Interaction*, 383-390.

Baker R.S., Corbett A.T., Koedinger K.R., Schneider, M.P. (2003) A Formative Evaluation of a Tutor for Scatterplot Generation: Evidence on Difficulty Factors. *Proceedings of the International Conference on Artificial Intelligence in Education*, 107-115.

Baker R.S., Corbett A.T., Koedinger K.R. (2002) The Resilience of Overgeneralization of Knowledge about Data Representations. Paper presented at American Educational Research Association Conference. Available from *Education Resources Information Center (ERIC) Database*, ERIC# ED465530.

Baker R.S., Corbett A.T., Koedinger K.R. (2001) Toward a Model of Learning Data Representations. *Proceedings of the 23rd Conference of the Cognitive Science Society*, 45-50.

Baker, R.S., Boilen, M., Goodrich, M., Tamassia, R., and Stibel, B.A.(1999) Testers and Visualizers for Teaching Data Structures. *30th ACM SIGCSE Technical Symposium on Computer Science Education*, 261-265.

### **Refereed Conference Short Papers and Poster Papers**

Baker, R.S., Corbett, A., Koedinger, K., Roll, I. (2005) Detecting When Students Game The System, Across Tutor Subjects and Classroom Cohorts . *Proceedings of User Modeling 2005*, 220-224.

Baker, R.S., Wagner, A.Z., Corbett, A.T., Koedinger, K.R. (2004) The Social Role of Technical Personnel in the Deployment of Intelligent Tutoring Systems. *Proceedings of 7<sup>th</sup> International Conference on Intelligent Tutoring Systems*, 785-787.

Roll, I., Baker, R.S., Aleven, V., Koedinger, K.R. (2004) A Metacognitive ACT-R model of Students' Learning Strategies in Intelligent Tutoring Systems. *Proceedings of 7<sup>th</sup> International Conference on Intelligent Tutoring Systems*, 854-856.

Roll, I., Baker, R.S., Aleven, V., Koedinger, K.R. (2004) What goals do students have when choosing the actions they perform? *Proceedings of 6<sup>th</sup> International Conference on Cognitive Modeling*, 380-381.

Dabbish L.A., Baker R.S. (2003) Administrative Assistants as Interruption Mediators. *ACM CHI: Computer-Human Interaction*, 1020-1021.

### **Edited Proceedings**

Heiner, C., Baker, R., Yacef, K. (Eds.) *Proceedings of the Workshop on Educational Data Mining, at the 8th International Conference on Intelligent Tutoring Systems*. Jhongli, Taiwan. July 2006.

### **Technical Reports**

Baker, R.S., Wagner, A.Z., Corbett, A.T., Koedinger, K.R. (2004) The Social Role of Technical Personnel in the Deployment of Intelligent Tutoring Systems. *CMU Technical Report CMU-HCII-04-100*, July 2004.

### **Workshop Papers/Presentations**

Baker, R.S.J.d. (accepted) Is Gaming the System State-or-Trait? Educational Data Mining Through the Multi-Contextual Application of a Validated Behavioral Model. Paper accepted to *Workshop on Data Mining for User Modeling, Educational Data Mining Track, at User Modeling 2007*.

Baker, R.S.J.d., Corbett, A.T., Wagner, A.Z. (2006) Human Classification of Low-Fidelity Replays of Student Actions. *Proceedings of the Workshop on Educational Data Mining at the 8<sup>th</sup> International Conference on Intelligent Tutoring Systems*, 29-36.

Baker, R.S., Beck, J.S. (2005) Psychometric Machine-Learned Models. *Presentation at the Educational Data Mining Workshop at the annual meeting of the American Association for Artificial Intelligence*.

Baker, R.S., Corbett, A.T., Koedinger, K.R. (2003) Statistical Techniques For Comparing ACT-R Models of Cognitive Performance. *Proceedings of the 10th Annual ACT-R Workshop*, 129-134.

### **Theses**

Baker, R.S. (2005) Designing Intelligent Tutors That Adapt to When Students Game the System. Doctoral Dissertation. Advisors: Kenneth R. Koedinger, Albert T. Corbett

Baker, R.S. (2000) PILOT: An Interactive Tool for Learning and Grading. Senior Honors Thesis, Brown University. Advisors: Roberto Tamassia, Thomas Dean.

### **Other Workshop and Conference Participation**

Baker, R.S. (2006) Educational Data Mining. Panel "Intelligent Tutoring Scales Up!" at 8<sup>th</sup> *International Conference on Intelligent Tutoring Systems*.

Koedinger, K.R., Baker, R.S. (2006) Production Systems. *Presentation at the TICL Masters Conference*.

Rosé, C.P., Anthony, L., Baker, R.S., Corbett, A.T., Pain, H., Porayska-Pomsta, K. (2004) Towards Encouraging a Learning Orientation Above a Performance Orientation. Panel at 7<sup>th</sup> *International Conference on Intelligent Tutoring Systems*, 907.

Baker R.S., Corbett A.T., Koedinger K.R. (2002) Distinct Errors Arising From a Single Misconception. Published as abstract, *Proceedings of the Cognitive Science Society Conference*, 990.

Baker R., Parberry I. (1996) Increasing Frame Rate In An Interactive Sprite Engine. Published as abstract, *Texas Academy of Science Conference*.

### **INVITED SEMINARS**

Developing Systems that Detect and Adapt to When Students Game the System. Human-Centered Technology Group, School of Informatics, University of Sussex. November 2, 2006.

Developing Systems that Detect and Adapt to When Students Game the System. School of Informatics, University of Edinburgh. October 27, 2006.

Scooter: an Agent Who Adapts to When Students Game the System. Mixed Reality Laboratory, School of Computer Science, University of Nottingham. October 20, 2006.

Gaming the System: How it Affects Learning and Why Students Do It. Pädagogische Psychologie Group, Department of Psychology, University of Muenster. July 14, 2005.

Remediating Resilient Overgeneralization in Data Representation. Pittsburgh Supergroup for Scientific Reasoning, University of Pittsburgh. October 10, 2003.

A model of resilient overgeneralization: When you know bar graphs, all data looks categorical. UIC Cognitive Brown Bag Lecture, University of Illinois at Chicago. November 20, 2001.

## **AWARDS**

**Best Paper Award.** 8<sup>th</sup> International Conference on Intelligent Tutoring Systems, 2006.

**Senior Prize in Computer Science.** Brown University, 2000.

## **GRANTS AND FELLOWSHIPS**

**Kaleidoscope Initiative.** A Centralized Research Data Repository. Melis, E., McLaren, B., Adam, J-M., David, J-P., Harrer, A., Mones, A.M., de Jong, T., Baker, R., Giraud, S., Martel, C. March-December 2007.

**National Defense Science and Engineering Graduate Fellowship.** American Society of Engineering Education/Department of Defense. Fall 2001- Spring 2004.

## **ACADEMIC SERVICE**

**Workshop Co-Chair.** Workshop on Data Mining for User Modeling. *11<sup>th</sup> International Conference on User Modeling.* 2007.

**Workshop Co-Chair.** Workshop on Educational Data Mining. *8<sup>th</sup> International Conference on Intelligent Tutoring Systems.* 2006.

**Workshop Organizing Committee.** Workshop on Analyzing Student-Tutor Interaction Logs to Improve Educational Outcomes. *7<sup>th</sup> International Conference on Intelligent Tutoring Systems.* Chair: Joseph Beck. 2004.

**Co-Founder and Webmaster.** International Working Group on Educational Data Mining. [www.educationaldatamining.org](http://www.educationaldatamining.org). 2006.

**Program Committee.** User Modeling (2007)  
Digital Game and Intelligent Toy Enhanced Learning (2007)  
Workshop on Educational Data Mining, ICALT (2007)  
Workshop on Educational Data Mining, AIED (2007)  
Workshop on Metacognition and Self-Regulated Learning in  
Intelligent Tutoring Systems, AIED (2007)

**Conference Reviewing.** Artificial Intelligence in Education (2007, 2005, 2003)  
User Modeling (2007, 2003)  
Computer-Human Interaction (2007)  
Digital Game and Intelligent Toy Enhanced Learning (2007)  
Cognitive Science Society (2007, 2005, 2003)  
Intelligent Tutoring Systems (2006, 2002)  
Computers in Education (2006)  
Cognitive Modeling (2004)  
European Cognitive Science Society (2003)  
American Educational Research Association (2003)  
Learning Sciences Conference (2002)  
Workshop on Educational Data Mining, ITS (2006)  
Workshop on Analyzing Student-Tutor Interaction Logs to Improve  
Educational Outcomes, ITS (2004)  
Workshop on Social and Emotional Intelligence in Learning  
Environments, ITS (2004)

**Journal Reviewing.** User Modeling and User-Adapted Interaction (2007, 2006)  
ACM Transactions on the Web (2007)  
Cognition and Instruction (2006)  
International Journal of Artificial Intelligence in Education (2006)

**Seminar Co-Organizer.** Research and Publication Reading Group. Learning Sciences Research  
Institute. University of Nottingham. 2006-2007.

**Seminar Organizer.** Human-Computer Interaction Institute PhD lunches. 2002-2004.