

Elise Stacey Agra
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University of Chicago
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Curriculum Vitae

Education

- 2015 Ph.D. Physics Kansas State University, Manhattan, KS
Specialization: Physics Education Research
Research Advisor: Dr. N. Sanjay Rebello
Dissertation: A Conceptual Model for Facilitating Learning from Physics Tasks
Using Visual Cueing and Outcome Feedback: Theory and
Experiments
Committee: Lester C. Loschky, Andrew Bennett, Brett DePaola,
Stephen Dyer (chair)
- 2012 M.S. Physics West Virginia University, Morgantown, WV
- 2005 B.S. Physics University of the Philippines, Quezon City, Philippines
Graduated Cum Laude
Thesis: Time-Fractional Dynamical Systems on a Ring

Employment

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| 2015 - | Postdoctoral Research Scholar | Department of Psychology
University of Chicago
PI: Dr. Sian L. Beilock |
| 2014-2015 | Graduate Research Assistant | Department of Physics
Kansas State University |
| 2012-2014 | Graduate Teaching Assistant | Department of Physics
Kansas State University |
| 2007-2012 | Graduate Research/Teaching Assistant | Department of Physics
West Virginia University |
| 2005-2007 | Instructor III | National Institute of Physics
University of the Philippines |

Research Experience

- 2014-2015 *Influence of Visual Cueing and Outcome Feedback on Think-Aloud Physics Problem Solving* Kansas State University

In collaboration with the Visual Cognition Laboratory of the Department of Psychology at Kansas State University, designed and executed a research

project to investigate the strategies that students use when solving conceptual physics problems that contain a diagram. An eye tracker was used to record students' eye movements as they solved physics problems, while a microphone synced to the eye tracker was used to record the verbal data. The effect of visual cues and outcome feedback on problem solving performance, and their effect on transfer and retention, was investigated. The differences in student reasoning patterns as an effect of receiving visual cues, outcome feedback, or both was also explored. Eye movements and verbal data were also analyzed to find patterns indicative of impasse.

2005-2007 *Numerical Optimization of a Reaction Rate Model* University of the Philippines

The efficiency of implementation of a model for molecular formation was investigated. Specifically, the error in obtaining the time to equilibrium of a system of two particles in terms of the number of collisions and the number of iterations in the simulation, which are based on the time step of the simulation, was determined. The model used both Hill and Lennard-Jones potentials. The molecular formation was modeled to make use of particle collisions and kinetic energy losses.

2003-2005 *Time-Fractional Dynamical Systems on a Ring* University of the Philippines

Two methods of solution were used to obtain analytical expressions for the time fractional dynamics corresponding to (i) a system consisting of N identical masses connected by Hookean springs and forming a ring, and (ii) a system consisting of 1 impurity mass and $N-1$ identical masses connected by Hookean springs for time-fractional order $1 < \alpha \leq 2$. Solutions in terms of generalized Mittag-Leffler functions were obtained using Laplace transform and matrix methods.

Peer-Reviewed Journal Publications

1. **Agra, E.**, Zu, T., Hutson, J., Loschky, L. C., & Rebello, N. S. (2015). Investigating impasse in think-aloud conceptual physics problem solving using eye movements. Manuscript in preparation.
2. **Agra, E.**, Modir, B, Hutson, J., Loschky, L. C., & Rebello, N. S. (2015). Influence of visual cueing and outcome feedback on transfer, retention, and confidence in conceptual physics problem solving. Manuscript in preparation.
3. Rouinfar, A., **Agra, E. S.**, Larson, A. M., Rebello, N. S., & Loschky, L. C. (2015). Effect of Visual Cueing and Outcome Feedback on Solving Conceptual Problems in Introductory Physics. Under review.
4. Rouinfar, A., **Agra, E.**, Larson, A. M., Rebello, N. S., & Loschky, L. C. (2014). Linking attentional processes and conceptual problem solving: Visual cues facilitate the automaticity of extracting relevant information from diagrams. *Frontiers in Psychology*, 5, 1094.

Peer-Reviewed Papers and Conference Proceedings

1. Zu, T., **Agra, E.**, Hutson, J., Loschky, L.C., & Rebello, N. S. (2016, April 14-17). *Comparing the Effects of Visual Cues and Video Solutions on Conceptual Problem Solving in College Physics*. Paper to be presented at the Annual Meeting of the National Association for Research in Science Teaching, Baltimore, MD.
2. **Agra, E.**, Johnson, D., Hutson, J. Loschky, L. C., & Rebello, N. S. (2015, July 29-30). *Influence of Visual Cueing and Outcome Feedback on Visual Attention during Problem Solving*. Paper presented at the Physics Education Research Conference, College Park, MD.
3. Zu, T., **Agra, E.**, Hutson, J. Loschky, L. C., & Rebello, N. S. (2015, July 29-30). *Effects of Visual Cues and Video Solutions on Conceptual Tasks*. Paper presented at the Physics Education Research Conference, College Park, MD.
4. **Agra, E.**, Burkett, M., Hutson, J., Loschky, L. C., & Rebello, N. S. (2015, April 11-14). *Student Reasoning During Conceptual Physics Problem Solving with Visual Cues or Feedback*. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Chicago, IL.
5. Wu, X., Zu, T., **Agra, E.**, & Rebello, N. S. (2015, April 11-14). *Perceptual Salience Influencing Undergraduate Students' Reasoning Resources on Introductory Physics Problems*. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Chicago, IL.
6. Wu, X., Zu, T., **Agra, E.**, and Rebello, N. S. (2015). Effect of Problem Solutions on Students' Reasoning Patterns on Conceptual Physics Problems. In P. V. Engelhardt, A. D. Churukian, & D. L. Jones (Eds.), *Physics Education Research Conference Proceedings* (pp. 279-282).
7. Rouinfar, A., **Agra, E.**, Murray, J., Larson, A., Loschky, L. C., & Rebello, N. S. (2014, April 3-7). *Influence of Visual Cueing and Correctness Feedback on Problem Solving*. Paper presented at the Annual Meeting of the American Educational Research Association, Philadelphia, PA.
8. Murray, J. W., Rouinfar, A., **Agra, E.**, Larson, A. M., Loschky, L. C., & Rebello, N. S. (2014, March 30-April 2). *Visual Cueing and Feedback Influencing Undergraduate Students' Reasoning Resources on Conceptual Physics Problems*. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Pittsburgh, PA.
9. Rouinfar, A., **Agra, E.**, Murray, J., Larson, A., Loschky, L. C., & Rebello, N. S. (2014). Influence of visual cueing on students' eye movements while solving physics problems. *Proceedings of the Symposium on Eye Tracking Research and Applications* (pp. 191-194). New York: ACM.
10. Rouinfar, A., **Agra, E.**, Murray, J., Larson, A. M., Loschky, L. C., & Rebello, N. S. (2014). Can Visual Cues and Correctness Feedback Influence Students' Reasoning? In P.V. Engelhardt, A.D. Churukian, & D.L. Jones (Eds.), *Physics Education Research Conference Proceedings* (pp. 305-308). Melville: AIP.

Contributed Talks

1. **Agra, E.**, Zu, T., Hutson, J., Loschky, L. C., & Rebello, N. S., (2015, July 25-29). *Investigating Problem Solving Automaticity Using Eye Movements*. Paper presented at the Summer Meeting of the American Association of Physics Teachers, College Park, Maryland.
2. Zu, T., **Agra, E.**, Hutson, J., Loschky, L. C., & Rebello, N. S., (2015, July 25-29). *Effects of Visual Cues and Video Solutions on Conceptual Tasks*. Paper presented at the Summer Meeting of the American Association of Physics Teachers, College Park, Maryland.

3. **Agra, E.**, Modir, B., Hutson, J., Loschky, L. C., & Rebello, N. S. (2015, January 3-6). *Self-Explanations Influencing Performance on Tasks with Feedback or Visual Cues*. Paper presented at the Winter Meeting of the American Association of Physics Teachers, San Diego, CA.
4. **Agra, E.**, Wu, X., Burkett, M., Loschky, L. C., & Rebello, N. S. (2014, July 26-30). *Influence of Visual Cueing and Correctness Feedback on Problem Solving*. Paper presented at the Summer Meeting of the American Association of Physics Teachers, Minneapolis, MN.
5. Rouinfar, A., **Agra, E.**, Larson, A. M., Loschky, L. C., & Rebello, N. S. (2014, July 26-30). *Visual Cues Increase Efficiency in Extracting Relevant Information from Diagrams*. Paper presented at the Summer Meeting of the American Association of Physics Teachers, Minneapolis, MN.
6. Wu, X., **Agra, E.**, Fracchiolla, C., & Rebello, N. S. (2014, July 26-30). *The Effects of Problem-solving Training on Students' Reasoning Abilities*. Paper presented at the Summer Meeting of the American Association of Physics Teachers, Minneapolis, MN.
7. Murray, J. W., Rouinfar, A., **Agra, E.**, Larson, A. M., Loschky, L. C., & Rebello, N. S. (2014, March 30-April 2). *Visual Cueing and Feedback Influencing Undergraduate Students' Reasoning Resources on Conceptual Physics Problems*. Paper Presented at the Annual Meeting of the National Association for Research in Science Teaching, Pittsburgh, PA.
8. Rouinfar, A., **Agra, E.**, Murray, J., Larson, A., Loschky, L. C., & Rebello, N. S. (2014, March 26-28). *Influence of visual cueing on students' eye movements while solving physics problems*. Paper presented at the Symposium on Eye Tracking Research and Applications, Safety Harbor, FL.
9. Rouinfar, A., **Agra, E.**, Murray, J., Wu, X., & Rebello, N. S. (2014, January 4-7). *Influence of Visual Cueing and Correctness Feedback on Students' Reasoning*. Paper presented at the Winter Meeting of the American Association of Physics Teachers, Orlando, FL.

Contributed Posters

1. **Agra, E.**, Johnson, D., Hutson, J., Loschky, L. S. & Rebello, N. S. (2015, July 29-30). *Influence of Visual Cueing and Outcome Feedback on Students' Visual Attention during Problem Solving*. Poster session presented at the Physics Education Research Conference, College Park, MD.
2. Modir, B., **Agra, E.**, Hutson, J., Loschky, L. S. & Rebello, N. S. (2015, July 29-30). *How does Applying the Gestalt Grouping Principle on the Display Design Influence Students' Reasoning?* Poster session presented at the Physics Education Research Conference, College Park, MD.
3. Zu, T, **Agra, E.**, Hutson, J., Loschky, L. S. & Rebello, N. S. (2015, July 29-30). *Effects of Visual Cues and Video Solutions on Conceptual Tasks*. Poster session presented at the Physics Education Research Conference, College Park, MD.
4. **Agra, E.**, Modir, B., Hutson, J., Loschky, L. C., & Rebello, N. S., (2015, July 25-29). *Visual Cueing and Outcome Feedback Influencing Transfer, Retention, and Confidence*. Poster session presented at the Summer Meeting of the American Association of Physics Teachers, College Park, Maryland.
5. Modir, B., **Agra, E.**, Hutson, J., Loschky, L. C., & Rebello, N. S., (2015, July 25-29). *Effect of Manipulating Display Design on Students' Reasoning*. Poster session presented at the Summer Meeting of the American Association of Physics Teachers, College Park, Maryland.
6. **Agra, E.**, Zu, T., Hutson, J., Loschky, L. C., & Rebello, N. S. (2015, January 3-6). *Self-Explanations Influencing Reasoning on Tasks with Feedback or Visual Cues*. Poster session

presented at the Winter Meeting of the American Association of Physics Teachers, San Diego, CA.

7. **Agra, E.**, Burkett, M., Hutson, J., Loschky, L. C., & Rebello, N. S. (2014, July 30-31). *Influence of Visual Cueing and Correctness Feedback on Students' Reasoning during Problem Solving*. Poster session presented at the Physics Education Research Conference, Minneapolis, MN.
8. Wu, X., **Agra, E.**, Fracchiolla, C., & Rebello, N. S. (2014, July 30-31). *Effect of Training on Students' Reasoning Patterns on Conceptual Physics Problems*. Poster session presented at the Physics Education Research Conference, Minneapolis, MN.
9. **Agra, E.**, Wu, X., Hutson, J., Loschky, L. C., & Rebello, N. S. (2014, July 26-30). *Influence of Visual Cueing on Eye Movements Using Think-Aloud Protocol*. Poster session presented at the Summer Meeting of the American Association of Physics Teachers, Minneapolis, MN.
10. Wu, X., **Agra, E.**, Fracchiolla, C., & Rebello, N. S. (2014, July 26-30). *How Does Problem-solving Training Affect Students' Reasoning Patterns?* Poster session presented at the Summer Meeting of the American Association of Physics Teachers, Minneapolis, MN.
11. Rouinfar, A., **Agra, E.**, Murray, J., Larson, A., Loschky, L. C., & Rebello, N. S. (2014, April 3-7). *Influence of Visual Cueing and Correctness Feedback on Problem Solving*. Poster session presented at the Annual Meeting of the American Educational Research Association, Philadelphia, PA.
12. Rouinfar, A., **Agra, E.**, Murray, J., Loschky, L. C., & Rebello, N. S. (2014, January 4-7). *Effect of Visual Cueing on Students' Eye Movements and Reasoning*. Poster session presented at the Winter Meeting of the American Association of Physics Teachers, Orlando, FL.
13. Rouinfar, A., **Agra, E.**, Murray, J., Larson, A. M., Loschky, L. C., & Rebello, N. S. (2013, July 17-18). *Can Visual Cues and Correctness Feedback Influence Students' Reasoning?* Poster session presented at the Physics Education Research Conference, Portland OR.

Teaching

Kansas State University

Fall 2012 - Spring 2014

Primary Studio Instructor Engineering Physics I Spring 2014

Description: calculus-based introductory physics course for physics and engineering majors, integrated laboratory and problem solving sessions, about 40 students.

Topics: mechanics, waves, fluids, and thermodynamics.

Responsibilities: assist students with homework questions and emphasize the connections between homework and laboratory demonstrations; prepare and grade quizzes, grade written homework, conduct review sessions before exams, mentor a secondary teaching assistant.

Secondary Studio Instructor Engineering Physics II Fall 2012 – Fall 2013

Description: calculus-based introductory physics course for physics and engineering majors, integrated laboratory and problem solving sessions, about 40 students.

Topics: electricity, magnetism, circuits and optics.

Responsibilities: assist students with laboratory activities and group problem solving, grade laboratory notebooks and homework assignments

West Virginia University

2007 - 2012

Laboratory Instructor

Introductory Physics I & II

Description: algebra-based introductory physics course for physics, science and engineering majors, about 24 students.

Topics: 1st semester: mechanics, sound, fluids, heat, and thermodynamics. 2nd semester: electricity, magnetism, circuits, optics, atomic and nuclear physics

Responsibilities: facilitated weekly laboratories, graded lab reports, prepare and grade quizzes.

University of the Philippines

2005 - 2007

Lecturer

Elementary Physics I

Description: algebra-based introductory physics course for science and engineering majors, about 100 students.

Topics: Newtonian mechanics

Responsibilities: 4-hours a week lecture, prepare and grade quizzes, prepare recitation materials, prepare and grade exams, mentor 4 recitation instructors.

Laboratory Instructor

Elementary Physics Lab I & 2

Description: algebra-based introductory physics course for science and engineering majors, about 30 students.

Topics: 1st semester: Newtonian mechanics. 2nd semester: electricity and magnetism, elementary optics.

Responsibilities: facilitated weekly laboratories, graded lab reports, prepare and grade quizzes, prepare and grade exams.

Recitation Instructor

Elementary Physics I & 2

Description: algebra-based introductory physics course for science and engineering majors, about 25 students.

Topics: 1st semester: Newtonian mechanics. 2nd semester: electricity and magnetism, elementary optics.

Responsibilities: facilitate weekly problem solving sessions, prepare and grade recitation quizzes.

Curriculum Development

2006-2007

Laboratory Manual for Elementary Physics I

University of the Philippines

Revised lab manual for first-semester algebra-based physics course for science and engineering majors.

Scholarships

University of the Philippines

2005-2007

Philippine Council for Advanced Science and Technology Research and Development Scholarship

Merit Scholar

2000-2005

Philippine Department of Science and Technology Scholarship

Merit Scholar

Affiliations

American Educational Research Association
National Association for Research in Science Teaching
American Association of Physics Teachers
The Honor Society of Phi Kappa Phi