

## Priti Shah

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### Employment History

1999-present      Assistant Professor, University of Michigan, Ann Arbor, MI  
1997-1999        Assistant Professor, University of Memphis, Memphis, TN  
1995-1997        Postdoctoral Fellow, University of California, Santa Barbara, CA

### Education

Carnegie Mellon University  
    Ph.D. in Cognitive Psychology, 1996  
    *Dissertation: Cognitive Processes in Graph Comprehension*  
    M.S. in Cognitive Psychology, 1992  
    *Thesis: Conceptual Limitations in Comprehending Line Graphs*  
University of North Carolina at Chapel Hill  
    A.B. in Psychology and Mathematics with highest honors, 1990  
    *Thesis: The relationship between spatial ability and mathematics ability*

### Fellowships and Honors

Rackham Faculty Fellowship, 2001  
American Psychological Association Division of Experimental Psychology New Investigator  
    Award for General Experimental Psychology, 1997  
National Academy of Education/Spencer Foundation Postdoctoral Fellowship, 1997-1999  
James S. McDonnell Foundation Postdoctoral Fellowship for Cognitive Studies in  
    Educational Practice, 1995-1997  
National Science Foundation Pre-doctoral Fellowship, 1990-1994  
American Psychological Association Dissertation Award, 1995  
British Psychological Association Travel Award, 1995  
National Merit Scholarship, 1986-1990  
Phi Beta Kappa; Psi Chi, 1990

### Edited Volumes

Lovett, M., & Shah, P. (Eds.) (in preparation). *Thinking with data*. Mahwah, NJ: Erlbaum.  
Shah, P., & Miyake, A. (Eds.) (2005). *The Cambridge handbook of visuospatial thinking*.  
    New York: Cambridge University Press.  
Miyake, A., & Shah, P. (Eds.) (1999). *Models of working memory: Mechanisms of active  
    maintenance and executive control*. New York: Cambridge University Press.

## Publications

- Chua, H. F., Yates, J. F., & Shah, P. (in press). Risk avoidance: Pictures vs. numbers. *Memory & Cognition*.
- Minear, M., & Shah, P. (in press). Sources of working memory deficits in children and possibilities for remediation. In S. Pickering (Ed). *Working memory and education*. Elsevier Press.
- Shah, P., Freedman, E., & Vekiri, I. (2005). The comprehension of quantitative information in graphical displays. In P. Shah and A. Miyake, (Eds.). *The Cambridge handbook of visuospatial thinking* (pp. 426-476). New York: Cambridge University Press.
- Wu, H., & Shah, P. (2004). Thinking with representations: Exploring visuospatial thinking in chemistry. *Science Education*, 88, 465-492.
- Shah, P. & Freedman, E. (2003). Visuospatial thinking in e-learning. *Journal of Educational Computing Research*, 29, 315-324.
- Shah, P. (2003) Memory for graphics, diagrams, and videos. In J. Guthrie (Ed.) *Encyclopedia of education* (Vol 5, pp. 1594-1596), New York: Macmillan.
- Freedman, E., & Shah, P. (2002). Toward a model of knowledge-based graph comprehension. In M. Hegarty & B. Meyer & H. Narayanan (Eds). *Diagrammatic representation and inference* (pp. 18-31). Berlin: Springer-Verlag.
- Shah, P., & Hoeffner, J. (2002). Review of graph comprehension research: Implications for instruction. *Educational Psychology Review*, 14, 47-69.
- Shah, P. (2001). Graph comprehension: The role of format, content, and individual differences. In M. Anderson, B. Meyer, & P. Olivier. (Ed) *Diagrammatic representation and reasoning* (pp. 173-185). Berlin: Springer Verlag.
- Miyake, A., Friedman, N. P., Rettinger, D. A., Shah, P., & Hegarty, M. (2001). Visuospatial working memory, central executive functioning, and psychometric visuospatial abilities: How are they related? *Journal of Experimental Psychology: General*, 130, 621-640.
- Hegarty, M., Shah, P. & Miyake, A. (2000). Constraints on using the dual task methodology to specify the degree of central executive involvement in cognitive tasks, *Memory & Cognition*, 28, 376-385.
- Shah, P., & Miyake, A. (1999). Models of working memory: An introduction. In A. Miyake & P. Shah (Eds.), *Models of working memory: Mechanisms of active maintenance and executive control* (pp. 1-26) . New York: Cambridge University Press.
- Miyake, A., & Shah, P. (1999). Toward unified theories of working memory: Emerging general consensus, unresolved theoretical issues, and future research directions. In

A. Miyake & P. Shah (Eds.), *Models of working memory: Mechanisms of active maintenance and executive control* (pp. 442-481). New York: Cambridge University Press.

Shah, P., Mayer, R. E., & Hegarty, M. (1999). Graphs as aids to knowledge construction: Signaling techniques for guiding the process of graph comprehension. *Journal of Educational Psychology*, *91*, 690-702.

Carpenter, P. A., & Shah, P. (1998). A model of the perceptual and conceptual processes in graph comprehension. *Journal of Experimental Psychology: Applied*, *4*, 75-100.

Shah, P. (1997). A model of the cognitive and perceptual processes in graphical display comprehension. In M. Anderson (Ed.), *Reasoning with diagrammatic representations II* (pp. 94-101). Menlo Park, CA: AAAI Press.

Shah, P., & Miyake, A. (1996). The separability of working memory resources for spatial thinking and language processing: An individual differences approach. *Journal of Experimental Psychology: General*, *125*, 4-27.

Shah, P., & Carpenter, P. A. (1995). Conceptual limitations in comprehending line graphs. *Journal of Experimental Psychology: General*, *124*, 43-61.

### **Book Reviews**

Shah, P. (2001). Improving statistical reasoning: An impressive feat, but what does it mean? [Review of the book *Improving statistical reasoning*]. *Applied Cognitive Psychology*, *15*, 696-697.

Shah, P. (1996). [Review of the book *Exploiting mental imagery with computers in mathematics education*]. *Journal of Educational Computing Research*, *14*, 199-204.

### **Manuscripts under review**

Boduroglu, A. & Shah, P. (under review). Orientation-specific configural representations in serial spatial working memory.

Minear, M., & Shah, P. (under review). Task switching training and transfer in two switching paradigms: Transferable improvement in global, but not local switch costs.

Shah, P., Freedman, E. G., Watkins, P., Rahman, M., & Miyake, A. (under review). How to build a better multivariate graph: The role of display characteristics, prior knowledge and task demands on the comprehension of line graphs.

Shah, P., Campbell, E., Freedman, E., Shellhammer, D., & Anderson, N. (under review). Extending models of graph comprehension: The interaction of format, prior knowledge, and graphical literacy.

White, H., & Shah, P. (under review a). Training task-shifting skill in adults with attention-deficit/hyperactivity disorder.

White, H., & Shah, P. (under review b). The uninhibited imagination: Creativity and attention deficit hyperactivity disorder.

### **Manuscripts in preparation**

Boduroglu, A & Shah, P (in preparation, a). Spatial configuration effects on visual change detection. Available upon request.

Bodurglu, A., & Shah, P. (in preparation, b). Complexity influences maintenance of spatial configurations but not individual locations. Available upon request.

Boduroglu, A., Shah, P., & Nisbett, D. (in preparation). Cross-cultural Differences In Contextual Processing In Visuospatial Short-term Memory. Available upon request.

Minear, M., Shah, P., & Park, D. (in preparation). The trainability of task-switching skills in older and younger adults. Available upon request.

Shah, P., Boduroglu, A., Freedman, E., & Watkins, P. (in preparation). Expertise and epistemological beliefs about data interpretation in science. Available upon request.

### **Conferences & Symposia Organized**

*Thinking with data*, June, 2004 at Carnegie Mellon University. This symposium, part of the Carnegie Symposium series, brought together researchers from developmental and cognitive psychology, statistics, philosophy, and science education who are interested in how people represent, reason with, and make decisions based on quantitative data (with Dr. Marsha Lovett).

*Benefits (or Pitfalls?) of Multimedia*, April 1999 at the Meeting of the American Educational Research Association in Montreal, CA. This symposium brought together a set of leading researchers in cognition and education who have developed multimedia educational tools that demonstrate exactly how, when, and for whom such technology can be used to help students learn.

*Individual differences in multimedia processing: Mechanical drawings, animations, graphs, maps, and web pages*, July, 1999 at the Society for Applied Research in Memory and Cognition in Boulder, CO. This symposium included a set of researchers interested in cognitive models of multimedia processing, and, in particular, the role of individual differences (with Dr. Arthur C. Graesser).

*Information Visualization Workshop*, June 1999 at the University of Memphis. This workshop brought together leading computer scientists and cognitive scientists interested in information display/visualization and data comprehension from academia and industry (with Dr. Jonathan Maletic).

*Models of Working Memory Symposium*, July, 1997 at the University of Colorado, Boulder. This symposium brought together prominent working memory researchers from the United States, Europe, and Japan (with Dr. Akira Miyake).

## Conference Presentations/Abstracts

- Minear, M. & Shah, P. (2005, June). Sources of transferable improvement in task switching performance. Poster presented at 17th annual meeting of the American Psychological Society, Los Angeles, CA.
- Boduroglu, A., Shah, P. & Nisbett, R. (May, 2005). Cultural differences in visuospatial working memory and attention. Paper presented at the annual Midwestern Conference for Culture, Language, and Cognition, Northwestern University, Evanston, IL.
- Boduroglu, A., Shah, P., & Nisbett, R. (November, 2004). Cross-cultural differences in contextual processing In visuospatial short-term memory. Poster presented at the 2004 meeting of the Psychonomic Society, Minneapolis, MN.
- Chua, H., Yates, J. F., & Shah, P. (November, 2004). Risk avoidance: Graphs vs. numbers; Cognitive and affective influences of the pictorial nature of graphs. Poster presented at the 2004 meeting of the Society for Judgment and Decision Making, Minneapolis, MN.
- Shah, P. (June, 2004). Learning and making decisions based on data. Paper presented at the 34<sup>th</sup> annual Carnegie Symposium: Thinking With Data, Pittsburgh, PA.
- Boduroglu, A., & Shah, P. (April, 2004). Orientation-specific configuration-based representations in spatial working memory. Poster presented at the annual meeting of the Vision Sciences Society, Sarasota, FL. [published abstract]
- Sims, B.C., Shah, P., Connor, C., Cameron, C., Slominski, L. (April, 2004). Instructional implications of executive functioning in early childhood: Relations between inhibition, sustained attention and self-regulation. Poster presented at the 2004 annual meeting of the American Education Research Association, San Diego, CA.
- Chua, H., Yates, J. F., & Shah, P. (November, 2003). Risk avoidance: Pictures vs. numbers. Paper presented at the 2003 annual meeting of the Psychonomic Society, Vancouver, BC, Canada
- Boduroglu, A., & Shah, P. (November, 2003). Visuospatial working memory: Serial recall and configuration strategies. Poster presented at the 2003 annual meeting of the Psychonomic Society, Vancouver, BC, Canada
- Shah, P., & Freedman, E., (June, 2003). A constraint-satisfaction model of the comprehension of graphs depicting quantitative data. Paper presented at the ONR Workshop on Attention, Perception, and Modeling for Complex Displays. Troy, NY
- Shah, P., Freedman, E., & Watkins, P. (April, 2003). The influence of prior content knowledge and graphical literacy skills on data interpretation. Paper presented at the 2003 annual meeting of the American Educational Research Association, Chicago, IL.

- White, H., & Shah, P. (November, 2002). Training of task-switching in adults with ADHD. Poster presented at the 2002 annual meeting of the Psychonomic Society, Orlando, FL.
- Shah, P., & Freedman, E. G. (2002). The role of prior knowledge in complex data comprehension. In J. G. Trafton (Chair), *The Cognition of Complex Visualization*. Symposium presented at the 24<sup>th</sup> annual meeting of the Cognitive Science Society, Fairfax, VA.
- Shah, P. (April, 2002). Invited speaker, final panel discussion session, Paper presented at the Diagrams 2002 Conference, Callaway Gardens, GA.
- Freedman, E., & Shah, P. (April, 2002). Toward a model of knowledge-based graph comprehension. Paper presented at the Diagrams 2002 Conference, Callaway Gardens, GA.
- Shah, P. (April, 2002). Discussant: Advances in text comprehension research. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Minear, M., Shah, P., Park, D. (April, 2002). Training task-shifting skills in older adults. Poster presented at the 2002 meeting of the Cognitive Aging Conference, Atlanta, GA.
- Biangardi, U. Shah, P., Asquith, R., & Martin, L. (April, 2002). Improving working memory. Poster presented at the 2000 annual meeting of the American Educational Research Association, New Orleans, LA.
- Biangardi, U. & Shah, P. (November, 2001). The trainability of working memory skills. Poster presented at the 2001 annual meeting of the Psychonomic Society, Orlando, FL.
- Freedman, E., & Shah, P. (November, 2001). Individual differences in domain knowledge, graph reading skills, and explanatory skills during graph comprehension. Poster presented at the 2001 annual meeting of the Psychonomic Society, Orlando, FL.
- Shah, P., Hoeffner, J. H., Gergle, D., Shellhammer, D., & Anderson, N. (November, 2000). A Construction-integration approach to graph comprehension. Poster presented at the 2000 annual meeting of the Psychonomic Society, New Orleans, LA.
- Shah, P., & Miyake, A. (November, 2000). Individual differences in simple and complex dual-task performance. Poster presented at the 2000 annual meeting of the Psychonomic Society, New Orleans, LA.
- Shah, P., Yetman, H., & Miyake, A. (November, 1999). The trainability of task-switching skill. Presented at the 1999 annual meeting of the Psychonomic Society, Los Angeles, CA.

- Emerson, M., Miyake, A., & Shah, P. (1999). Task-shifting and specificity of training. Presented at the 1999 annual meeting of the Psychonomic Society, Los Angeles, CA.
- Shah, P., & Shellhammer, D. (June, 1999). *The Role of Domain Knowledge and Graph Reading Skills in Graph Comprehension*. Presented at the 1999 meeting of the Society for Applied Research in Memory and Cognition, Boulder, CO.
- Shah, P. (May, 1999). Graph comprehension: Cognitive processes and practical implications. Paper presented at the Information Visualization Workshop, Memphis, TN.
- Varma, S., Shah, P., & Varma, K. (April, 1999). The effect of domain experience on strategy selection and estimation when solving fermi problems. Presented at the 1999 annual meeting of the American Educational Research Association, Montreal, CA.
- Shah, P., Hegarty, M., & Miyake, A. (November, 1997). Working memory and spatial abilities: Limitations of dual-task methodology. Poster presented at the 1997 annual meeting of the Psychonomic Society, Philadelphia, PA.
- Shah, P., Mayer, R., & Hegarty, M. (April, 1997). Which graphs are better? Textbook graphs as aids to knowledge construction. Paper presented at the 1997 annual meeting of the American Educational Research Association, Chicago, IL.
- Shah, P., Mayer, R., & Hegarty, M. (September, 1996). The interpretation of graphs as a constructive process. Presented at the 1996 annual meeting of the McDonnell Foundation, St. Louis, MO.
- Shah, P., & Carpenter, P. A. (November, 1996). Cognitive and perceptual factors in graph comprehension. Presented at the 1996 annual meeting of the Psychonomic Society, Chicago, IL.
- Miyake, A., Rettinger, D., Shah, P., & Hegarty, M. (November, 1996). A reinterpretation of psychometric visuospatial abilities in terms of a multi-component model of working memory. Presented at the 1996 annual meeting of the Psychonomic Society, Chicago, IL.
- Shah, P. (September, 1995). The interpretation of graph in context: Applications to high school social science education. Presented at the 1995 annual meeting of the McDonnell Foundation, Nashville, TN.
- Shah P., & Carpenter, P.A. (November, 1994). Conceptual limitations in comprehending graphs. Presented at the 1994 annual meeting of the Psychonomic Society, St. Louis, MO.
- Miyake, A., Shah, P., Carpenter, P. A., & Just, M. A. (November, 1994). Individual differences in spatial and verbal working memory. Presented at the 1994 annual meeting of the Psychonomic Society, St. Louis, MO.

Shah, P. & Miyake, A. (July, 1994). Individual differences in spatial working memory. Presented at the International Conference on Working Memory, Cambridge, England.

Furman, L., Barron, B., Montavon, E., Vye, N. J., Bransford, J. D., & Shah, P. (April, 1989). The effects of problem formulation training and type of feedback on math handicapped students' problem-solving abilities. Presented at the 1989 annual meeting of the American Educational Research Association, San Francisco, CA.

### **Invited Talks**

University of Colorado, Boulder, Institute of Cognitive Science  
University of Memphis Department of Psychology  
University of Oklahoma Department of Psychology  
Kent State University Department of Psychology  
University of Michigan Department of Psychology  
University of Michigan, Tribute to Paul Pintrich

### **Current Grant Support**

*General and specific training of executive function in older adults*, Principal Investigator, \$18,000, 2003-2005.

*Deciding about tamoxifen prophylaxis: Developing and refining a decision aid using fractional factorial experiments*, Co-Investigator (Peter Ubel, PI), National Institute of Cancer, \$7,637,298, 2003-2008.

### **Previous Grant Support**

*33rd Carnegie Symposium on Cognition: Thinking with Data*, Co-Investigator (Marsha Lovett, PI), National Science Foundation, \$37,000, 2004-2005.

*Thinking with Data Symposium*, Co-Investigator (Marsha Lovett, PI), Office of Naval Research, \$10,000, 2004-2005.

*Facilitating decision-making based on complex data*, Principal Investigator, The Office of Naval Research, \$160,000, 2002-2003.

*Training executive control skills in ADHD and non-ADHD groups*, Principal Investigator, Rackham, \$14,800, 2002-2003.

*Task-switching training and transfer in older adults and younger adults*, Principal Investigator, The Roybal Center on Aging and Cognition: Health, Education, and Training (CACHET) seed grant, \$5,000, 2002-2004.

*Cognitive studies of complex data visualization*, Principal Investigator, Office of Naval Research, \$71,385, 1998-2001.

*Cognitive aspects of visual information filtering for force management*, Principal Investigator, Office of Naval Research, \$7,638, 1998-1999.

*Workshop on data visualization*, Principal Investigator, Office of Naval Research and National Science Foundation, \$19,426, 1999-2000.

*Expert-novice studies of graph interpretation: Implications for teaching graphical literacy*, Principal Investigator, National Academy of Education, \$40,000, 1997-1999.

*Models of working memory conference*, Co-Investigator (Akira Miyake, PI), Office of Naval Research, \$10,000, 1997-1998.

*The comprehension of graphs in context: Applications to high school social science education*, Principal Investigator, James S. McDonnell Foundation Postdoctoral Fellowship for Cognitive Studies in Educational Practice Program, \$52,000, 1995-1997.

## **Teaching Experience**

### Undergraduate courses

Psychological Perspectives on the College Experience (First-year seminar), Winter 2002  
Learning and Thinking: Implications for College and Beyond, Winter 2001  
Psychology of Thinking, Fall 2000; Fall, 2001, Fall 2004  
Learning to Learn, Winter 2000 (with Dr. Bill McKeachie)  
Mind, Brain, & Intelligence (honors seminar), Fall 1997; Fall 1998  
Thinking and Cognitive Processes, Spring 1998; Spring 1999

### Graduate courses

Learning, Thinking, and Problem Solving, Fall 1999, Fall 2000, Fall 2001, Fall 2003, Fall 2004  
Visuospatial Cognition, Winter 2000, Winter 2005  
Cognitive Methods for Instructional Research, Fall 2002

## **Professional Affiliations**

American Educational Research Association  
American Psychological Society  
Cognitive Science Society  
Psychonomic Society  
Sigma Xi  
Women in Cognitive Science

## **Administrative Experience**

University of Michigan Junior Women Faculty Network Advisory Committee (2003-2005)  
University of Michigan Psychology Department Augmented Executive Committee (2001)  
University of Michigan Combined Program in Education and Psychology Student Recruitment/Publicity Committee (2000-2004; Chair 2004-2005)

University of Michigan Combined Program in Education and Psychology Admissions Committee (2004-2005)  
University of Michigan Combined Program in Education and Psychology Executive Committee (1999-2005)  
University of Michigan Department of Education Search Committee (1999-2000, 2000-2001, 2001-2002)  
University of Michigan Cognition & Perception Admissions Committee (2000-2001; 2002-2003)  
University of Michigan Cognition & Perception Recruitment Weekend Committee Chair (1999-2002)  
University of Memphis Biopsychology Search Committee (1998-1999)  
University of Memphis General Education Program Coordinator (1998-1999)  
University of Memphis Psychology Department Undergraduate Curriculum Committee (1997-1999)  
University of Memphis Department of Psychology Cognitive and Social Speaker Series Organizer (Spring 1998-1999)  
CMU Psychology Department Colloquium committee (1990-1992)  
CMU Psychology Department *Science Meets the Profession* seminar committee (1991-1993)  
CMU Psychology Department Graduate Student representative to faculty meetings (1994-1995)  
CMU Psychology department representative to *Women in Non-Traditional Graduate Students (WINGS)* (1990-1992)

## **Professional Activities**

### Ad-hoc reviewer

*ACM Transactions on Human-Computer Interaction*  
*Applied Cognitive Psychology*  
*Canadian Journal of Experimental Psychology*  
*Cognition and Instruction*  
*Cognitive Psychology*  
*Cognitive Science*  
*Educational Psychologist*  
*European Journal of Cognitive Psychology*  
*Journal of Behavioral Decision Making*  
*Journal of Educational Psychology*  
*Journal of Educational Computing Research*  
*Journal of Experimental Psychology: Applied*  
*Journal of Experimental Psychology: General*  
*Journal of Experimental Psychology: Learning, Memory, & Cognition*  
*Journal of Research in Mathematics Education*  
*Memory & Cognition*  
*Neuroscience*  
*Psychology & Aging*  
*Psychological reports/Perceptual and Motor Skills*  
*Psychological Science*  
*Psychonomic Bulletin & Review*  
*Quarterly Journal of Experimental Psychology*

*Spatial Cognition & Computation*  
*Trends in Cognitive Sciences*

Proposal and Grant Review Committees

Department of Education/Institute for Educational Studies Review Panel, March 2004

NSF-ROLE (Research on Learning and Education) Review panel, April 2005

Cambridge University Press Reviewer

Cognitive Science Society Annual Meeting reviewer (2004)

Society for Research in Child Development review committee (2003 annual meeting)

*Handbook of Applied Cognition* reviewer

Conference on Spatial Information Theory Scientific review committee, 2001

Diagrams 2002 & 2004 (conference jointly sponsored by the American Association for Artificial Intelligence and the Cognitive Science Society) program committees

American Educational Research Association reviewer (1996, 2002, 2003 annual meetings)

**Media attention**

United Press International interview & article on visuospatial abilities, December, 2001

Intellihealth article on visuospatial abilities, December, 2001