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**EDUCATION**

- S.B. (1960) Electrical Engineering, Massachusetts Institute of Technology
- M.S. (1965) Graduate School of Industrial Administration, Carnegie Institute of Technology
- Ph.D. (1968) Graduate School of Industrial Administration, Carnegie Mellon University  
Major Area: Organizations and Social Behavior  
Thesis: Decision Making and Search in a Complex Environment

**EMPLOYMENT HISTORY**Non-Academic

- 1960-1961 Wolf Research and Development Corporation, Bedford, Massachusetts.  
Design and implementation of simulated adaptive machine.
- 1961-1962 North American Air Defense Command Headquarters, Colorado Springs, Colorado.  
Development of systems programs for satellite detection and tracking system.
- 1963 National Aviation Facilities Experimental Centre of the Federal Aviation Agency,  
Northfield, New Jersey. Statistical analysis and programming. (Summer)
- 1964 Westinghouse Electric Corporation, Pittsburgh, PA.  
Research on organizational impact of management information systems. (Summer)

Academic

- 1964-1966 Instructor, Mathematics Department, Carnegie Institute of Technology
- 1966-1967 Instructor, Graduate School of Business, University of Chicago
- 1967-1969 Assistant Professor of Behavioral and Information Sciences, Graduate School of Business,  
University of Chicago (on leave 1968- 1969)
- 1968 Visiting Research Fellow, Department of Education, University of Stirling, Scotland
- 1969 Visiting Fulbright Lecturer, London Graduate School of Business Studies
- 1969-1976 Associate Professor, Graduate School of Industrial Administration and  
Department of Psychology, Carnegie Mellon University
- 1976 - Professor, Department of Psychology, Carnegie Mellon University**
- 1983-1993 Head, Department of Psychology, Carnegie Mellon University
- 1988-1996 Director, Literacy in Science Center, Carnegie Mellon University
- 2005 - Training Director: Program in Interdisciplinary Education Research**
- 2005 - Executive Committee and Education Director: Pittsburgh Science of Learning Center**

**CONSULTING EXPERIENCE**

1968	Outside consultant on New College, Carnegie Mellon University
1969	Invited seminars at: British Federation of Young Master Printers Imperial Chemical Industries Irish Management Institute University of Groningen; University of Sarajevo .
1970	Community Psychiatry Seminars, University of Chicago.
1971	U.S. Office of Education, Office of Program Planning and Evaluation.
1973	Goldmark Communications Corporation, Stamford, Connecticut.
1973-77	Consultant: National Institute of Education, Basic Skills.
1981-1983	Consultant: Children's Computer Workshop.
2004 -	Various education publishers

**PROFESSIONAL ACTIVITIES**

Member: National Academy of Education  
Cognitive Science Society  
Society for Research in Child Development  
Cognitive Development Society (Board of Governors 2003-08)

Fellow: Inaugural Fellow, American Educational Research Association  
Division 7 (Developmental), American Psychological Association  
Division 3 (Experimental), American Psychological Association  
Founding Fellow, American Psychological Society

Executive Board: Council of Graduate Departments of Psychology (1986-89)

Committees: Fulbright Commission Screening Committee (1969-1972)

Journal Consulting Editorships or Reviewer:

<i>American Educational Research Journal</i>	<i>American Journal of Psychology</i>	<i>Child Development</i>	<i>Cognitive Development</i>
<i>Cognitive Psychology</i>	<i>Cognitive Science</i>	<i>Communications of the ACM</i>	<i>Developmental Psychology</i>
<i>Human Development</i>	<i>International Journal of Behavioral Development</i>	<i>Journal of Business</i>	<i>Journal of Experimental Child Psychology</i>
<i>Journal of Experimental Psychology: General</i>	<i>Journal of Math Education</i>	<i>Journal of Mathematical Psychology</i>	<i>Journal of the American Statistical Association</i>
<i>Management Science</i>	<i>Memory &amp; Cognition</i>	<i>Merrill-Palmer Quarterly</i>	<i>Psychological Bulletin</i>
<i>Psychological Review</i>	<i>Psychometrika</i>	<i>Review of Educational Research</i>	<i>Science</i>

Series Editor: *Carnegie Mellon Symposia on Cognition*

Grant Reviewer: Institute of Education Sciences  
National Institute of Mental Health  
Canadian Research Council  
National Science Foundation  
Australian Research Grants Committee  
Institute for Education Sciences

Panel & Boards 1981 - 83 Review Panel, Memory and Cognitive Processes Program, NSF  
1985 NRC Working Group on the Development of Cognitive and Social Competence  
1987 - International Advisory Board, Human Development Unit, Tel Aviv University  
1990 -96 Advisory Board, CSEP, James S. McDonnell Foundation  
1994 -98 NIH Study Section: HUD-1  
1998 -01 Committee on Educational and Psychological Foundations of Assessment, National Academy of Science  
2002- Review Panel, Research on Learning & Education, (ROLE) NSF  
2003 -04 Committee on Research in Education (CORE) National Academy of Science  
2004 Chair: Math and Science Review Panel, Institute of Education Sciences  
2004 - 06 Editorial Board, *Developmental Psychology* (APA, publisher)  
2004 - 06 NRC Committee on Science Education (K-8)  
2006 - Advisory Board, Brain, Mind & Behavior Program, James S. McDonnell Foundation  
2007 - Editorial Board, Journal of Psychology of Science and Technology

**AWARDS and GRANTS****Past**

1964-1966 Ford Foundation Fellowships  
 1968 Social Science Research Council Fellow, University of Stirling, Scotland  
 1973-1976 Grant from the Spencer Foundation: Information Processing Models of Cognitive Development  
 1974 Grant from ONR to organize a research conference on cognition and instruction  
 1977-1980 Grant from the National Science Foundation for research on children's problem solving (BNS77-16905)  
 1978-1981 Grant from the National Institute of Education for research on problem solving in preschool children (NIE-6-78-0035)  
 1981-1983 Grant from National Science Foundation for continued research on problem solving in preschool children (BNS81-12743)  
 1981-1984 Grant from the Spencer Foundation for research on instruction in problem solving  
 1984-1986 Grant from the Spencer Foundation for research on acquisition of knowledge about complex devices  
 1986-1988 Grant from National Science Foundation for research on LOGO debugging skills (MDR-8554464)  
 1987 Grant from National Science Foundation to support Carnegie Symposium on Cognition (BSN-86-20193)  
 1989-1994 Six yr. grant: A.W. Mellon Foundation to establish the Literacy in Science Center (with 7 others)  
 1989-2004 Fifteen-yr. grant: NICHD: Scientific Discovery Processes of Adults and Children (R01 HD25211)  
 1996-2001 Four yr. grant: McDonnell Foundation: Integrating Instruction on a Control of Variables Strategy  
 2001-2002 J.M.Cattell Sabbatical Award  
 2002-2006 Four year grant from NSF: *Fundamentals of Experimental Science in Early Science Education.*

**Active**

2004 – 2014 Co-PI on NSF Science of Learning Center  
 2004- 2009 Training Director, Pre-Doctoral training grant IES  
 2006 - 2009 Three year grant from Dept. of Education: *Training in Experimental Design-Developing Scalable and Adaptive Computer-based Science Instruction*

**UNIVERSITY SERVICE (SINCE 1980)**

1980-1981: Chair, H&SS P & T Committee; Member, Presidents' Faculty Policy Committee;  
 Chair, Developmental Search Committee; Organizer, Developmental Scholars Program  
 1982-1983: Presidential Appointee, Faculty Affairs Committee  
 1984-1985: Member, H&SS Dean Search Committee  
 1985-1986: Member, Athletic Department Evaluation Committee  
 1990-1992 Member, Committee on Work and the Family  
 1995-1996 Member, Faculty Senate Committee to Evaluate the President  
 1996-1998 Member, University Promotion & Tenure Committee  
 1996-1997 Guest lecturer, Academy of Life Long Learning  
 1999-2000 Chair, Developmental Search Committee  
 2000-2001 Acting Director, Graduate Program  
 2000-2004 Member, Perpetual Developmental Search Committee  
 2003-2004 Member, Faculty Senate Faculty Review Committee

**RESEARCH INTERESTS**

Cognitive psychology, especially information processing analysis of cognitive development, problem solving instruction, scientific discovery in children and adults, instructional interventions in science.

**EDUCATIONAL INTERESTS**Names of Courses Taught (Prior to 1969)

Data Processing and Computer Programming	Interpersonal Behavior	Human Behavior
Organizations: Structure and Process	Mathematical Models in the Behavioral Sciences	Digital Computers
Mathematical Analysis for Business	Simulation of Cognitive Processes	Management Information Systems

Major Educational Activities (1969-1973): Director of Educational Research and Development Unit, Graduate School of Industrial Administration, Carnegie Mellon University.

Recent Courses

Development of Quantitative Processes	Cognitive Development
Seminar on Scientific Reasoning	Cognitive Processes and Problem Solving
Psychological Processes in Decision Making	Social Psychology (Introduction)
Cognition and Instruction	Introduction to Child Development
Research Methods in Child Development	Seminar on Children and Computing
Scientific Research in Education	Seminar on Scientific Discovery & Psychology

## PROFESSIONAL ACTIVITIES

## 1976

- February Colloquium, Department of Psychology, Yale University
- April Various sessions, AERA, San Francisco
- June Participant, NIE Planning Conference on the Role of Hand Calculators in Mathematics Instruction
- July Invited address, International Association for Cross Cultural Research, Tilburg, The Netherlands
- July Paper presentation, 21st International Congress of Psychology, Paris, France

## 1977

- February Seminar, Department of Psychology, University of Colorado
- March Colloquium, Institute for Human Learning, University of California, Berkeley
- April Discussant and paper presentation at annual meeting of AERA, New York
- June Invited participant at NATO Advanced Study Institute, Banff, Alberta, Canada
- September Invited participant at Workshop on Developmental Models of Thinking; Institut fur de Padagogik der Naturwissenschaften, University of Kiel, West Germany
- November Paper presentation, Psychonomic Society

## 1978

- February Colloquium and Visiting Scholar, Group in Science and Mathematics Education, University of California, Berkeley
- March Paper presentation at Annual meeting of AERA, Toronto, Canada
- April Invited paper at IEEE Computer Society Workshop on Pattern Recognition and Artificial Intelligence, Princeton, New Jersey
- August Panel Chairman at NIE Research Conference on Testing, Falmouth, Massachusetts
- October Colloquium, National Institute of Education, Washington, D.C.
- November Paper presentation, Psychonomic Society Meeting, San Antonio, Texas
- December Visiting Scholar, Department of Psychology, University of Iowa (1 week)

## 1979

- March Paper presentations at the biennial meeting of the SRCD, San Francisco, California
- April Invited symposium, annual meetings of AERA, San Francisco, California
- June Invited address. Conference on U-Shaped Development, Tel-Aviv University, Israel
- October Colloquium, Department of Psychology, Stanford University
- November Paper presentation, Psychonomic Society Meeting, Phoenix, Arizona
- November Invited participant, Wingspread Conference on Basic Processing in Mathematics Learning, Racine, Wisconsin

## 1980

- February Visiting Scholar, School of Education, Deakin University, Geelong, Victoria, Australia, (3 weeks)
- April Colloquium, School of Education, Stanford University
- April Colloquium, Group in Science and Mathematics Education, University of California, Berkeley

## 1981

- March Colloquium, Graduate Center, City University of New York
- April Symposium presentation, Biennial Meeting of the SRCD, Boston, Massachusetts
- November Paper presentation, Psychonomics Society, Philadelphia, Pennsylvania

## 1982

- November Paper presentation, Psychonomics Society, Minneapolis, Minnesota

## 1983

- January Paper presentation, Interdisciplinary Conference, Steamboat Springs, Colorado
- May Discussant, 18th Annual Carnegie Symposium on Cognition
- December Paper presentation, CHI'83 (Human Factors in Computing Systems), Boston, Massachusetts

## 1984

- June Paper presentation. 6th Annual Meetings of the Cognitive Science Society, Boulder, Colorado

## 1985

- April Symposium presentation, Biennial Meeting of the Society for Research in Child Development. Toronto
- October Colloquium, Department of Psychology, University of West Virginia
- November Paper presentation. Psychonomic Society Meeting. Boston, Massachusetts

## 1986

- November Paper presentation. Psychonomic Society Meeting. New Orleans, Louisiana

## 1987

- April Symposium, Biennial Meeting of the Society for Research in Child Development, Baltimore, MD.
- April Paper presentation at Annual meeting of AERA, Washington, D.C.
- May Paper presentation. 3rd Annual Conference on AI and Education, University of Pittsburgh
- May Paper presentation. 21st Annual Carnegie Symposium on Cognition
- October Colloquium, Center for Decision Sciences, University of Chicago
- November Paper presentation. Psychonomic Society Meeting. Seattle, Washington

## 1988

- March Invited paper presentation. Regional Computer Resource Center, University of Pittsburgh
- April Invited seminar. Artificial Intelligence Seminar Series. DEC, Marlborough, Massachusetts
- August Invited seminar. Cognitive Science Society, Montreal, Canada

## 1989

- January Invited seminar. Conference on Scientific Reasoning, Stanford University
- April Invited symposium: Theories of Cognitive Development, Biennial Meeting SRCD, Kansas City
- October Colloquium, Center for Cognitive Science, UCLA
- October Colloquium, Cognitive Science Program, UCSB

**1990**

April Colloquium, Cognitive Science Program and Department of Psychology, University of Illinois

October Colloquium, Cognitive Science Program, Brown University

**1991**

April Symposium discussant, Biennial Meeting, SRCD, Seattle, Washington

July Invited symposium participation, XIth Biennial Meetings of ISSBD, Minneapolis, Minnesota

June Poster (with David Penner), American Psychological Society Meetings, Washington, D.C.

August Poster (with Takeshi Okada): Cognitive Science Meetings, Ann Arbor, Michigan

November Invited Lectures at the Instituto Internacional de Estudios Avanzados, Caracas Venezuela

November Poster (with Kevin Dunbar & Anne Fay) Psychonomic Society Meeting, San Francisco

**1992**

April Invited paper, Conference on "The Development of Future Oriented Processes, Breckenridge, Colorado

May Poster (with Tony Simon and Allen Newell), 22nd Annual Symposium of Piaget Society, Montreal

July Keynote address, 9th International Machine Learning Conference, Aberdeen, Scotland

August Invited briefing, OSD Net Assessment Summer Seminar, Naval War College, Newport, RI.

October Invited speaker. Newell Festschrift Department of Computer Science, Carnegie Mellon University

**1993**

March Discussant and paper presentations. 60th Anniversary Meeting SRCD. New Orleans

April Colloquium, Cognitive Science Program, Brandeis University

May Consultant, SAE Middle School Curriculum Committee

September Consultant, Russell Sage Foundation, NY

**1994**

April Paper presentation (with Shari Ellis and Robert Siegler). AERA Meeting New Orleans

April Invited Symposium: 13th Biennial Conference on Human Development, Pittsburgh, Pa.

May Paper presentation (with Shari Ellis and Robert Siegler). Piaget Society Meetings, Chicago, Illinois

July Invited discussant. LOGIC Conference, Max Plank Institute, Castle Ringberg, Bavaria

**1995**

March Invited Presentation (with Christian Schunn). AAAI Spring Symposium

March Invited discussant; Poster (with Anne Fay) SRCD Meetings, Inidanapolis

July Paper presentation (with Christian Schunn) Cognitive Science Meetings, Pittsburgh

October Invited symposium: Society for Social Studies of Science Annual Meeting, Charlottesville, VA

**1996**

April Round Table presentation (with Lisa Haverty). AERA, New York

June Invited Plenary speaker, Piaget Society Meetings, Philadelphia

July Invited symposium presentation (with Chris Schunn), Cognitive Science Meetings, San Diego

**1997**

April Symposium on Scientific Reasoning, SRCD, Washington, DC

August Paper and Poaster at 19th Annual Meeting of Cognitive Science Society, Stanford, CA

**1998**

February Invited presentation at the 150th annual meeting of the AAAS

March Invited colloquium, Cognitive Science Program, Ohio State University

April Invited paper: Designing for Science Symposium, LRDC, University of Pittsburgh

October Discussant: 29th Annual Carnegie Symposium on Cognition

December Invited Workshop: Behavioral Science Workshop, Center for Decision Research, University of Chicago

**1999**

March Symposium, National Association for Research in Science Teaching, Boston

April Symposium, SRCD, Albuquerque, NM.

July Keynote Speaker: 3<sup>rd</sup> International Conference on Teacher Education, Beit Berl, Israel

June Organizer & Presenter: 30th Annual Carnegie Symposium on Cognition & Instruction

October Invited Symposium on Scientific Reasoning. First Meeting of the Cognitive Development Society

**2000**

April Paper presentation (w/ E. Toth): AERA annual meeting. New Orleans

August Various papers at annual meeting of Cognitive Science Society

**2001**

January Invited presentation at Trinity College, Dublin

March Invited rapporteur: Workshop on Scientific Principles in Education Research, National Research Council

April Varous papers (w/ E. Toth, A. Masnick, L. Triona): AERA annual meeting. Seattle

Paper (with A. Masnick) at SRCD

May Symposium organizer & presenter at Piaget Society annual meeting, Berkley, CA

August Paper presentation (w/ A. Masnick): Cognitive Science 23rd annual meeting. Edinburgh, Scotland.

October Invited Symposium Paper, 2nd Biennial Meeting of the Cognitive Development Society

November Invited Colloquium, Dept. of Psychology, Bowling Green State University

**2002**

August Paper presentations: Cognitive Science Soc.

September Keynote address. NSF Conference of Engineering and Computing Education Grantees

**2003 - 2011** <More of the same!> ...

## PUBLICATIONS

## Books

- Klahr, D. (Ed.). (1976). *Cognition and instruction*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr, D., & Wallace, J. G. (1976). *Cognitive development: An information processing view*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr, D., Langley, P., & Neches, R. (Eds.). (1987). *Production system models of learning and development*. Cambridge, MA: MIT Press.
- Klahr, D., & Kotovsky, K. (Eds.). (1989). *Complex information processing: The impact of Herbert A. Simon*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr (2000) *Exploring Science: The Cognition and Development of Discovery Processes*. Cambridge, MA: MIT Press.

Reviews of Exploring Science:

Cheng, P. (2002) *Quarterly Journal of Experimental Psychology*, 55, 692-695.

Greisdorf, H. (2003) *Journal of Documentation*, 59 (2), 222-224.

Ione, A. (2003) *Leonardo Reviews*.

[http://lea.mit.edu/reviews/may2003/Exploring\\_ione.html](http://lea.mit.edu/reviews/may2003/Exploring_ione.html)

Kantorovich A. (2004) *Pragmatics & Cognition*, 2004, 12, 195-200.

Minnen, D.& Nersessian, N. (2003). *Contemporary Psychology*,

Porath, M. (2002). *High Ability Studies*, 13, 79-82

Preda, A (2003) *Culture & Psychology*, 9 (3), 299-311

Schauble, L. (2003) Scientific Thinking: More on What Develops. *Human Development*, 46, 155-160.

Carver, S. M. & Klahr D. (Eds.) (2001) *Cognition and Instruction: 25 years of progress*. Mahwah, NJ: LEA

**Contributing author to following publications of the National Academy of Sciences**

Pellegrino, J. W, Chudowsky, N. & Glaser, R. (Eds.) (2001) *Knowing What Students Know: The Science and Design of Educational Assessment*. Washington, DC.: National Academies Press. (Committee on the Foundations of Assessment).

Towne, L., Wise, L. L. & Winters, T. M. (Eds.) (2004) *Advancing Scientific Research in Education*. Washington, DC.: National Academies Press. (Committee on Research in Education)

Duschl, R. A., Schweingruber, H. A., & Shouse, A. W. (Eds.) (2007) *Taking Science to School: Learning and Teaching Science in Grades K-8*. Washington, DC.: National Academies Press. (Committee on Science Learning, Kindergarten through Eighth Grade.)

**Journal Articles and Book Chapters**

- Klahr, D. (1966). A computer simulation of the paradox of voting. *American Political Science Review*, LX, 384-390.
- Klahr, D., & Leavitt, H.J. (1967). Tasks, organization structures and computer programs. In C.A. Meyers (Ed.), *The impact of computers on management*. Cambridge, MA: MIT Press.
- Klahr, D. (1969). Decision making in a complex environment. *Management Science*, 15, 595-618.
- Klahr, D. (1969). Statistical significance of Kruskal's nonmetric multidimensional scaling technique. *Psychometrika*, 34, 190-204.
- Klahr, D. (1970). A study of consumers' cognitive structure for cigarette brands. *Journal of Business*, 43, 190-204.
- Klahr, D., & Wallace, J. G. (1970). The development of serial completion strategies: An information processing analysis. *British Journal of Psychology*, 61, 243-257.
- Klahr, D., & Wallace, J. G. (1970). An information processing analysis of some Piagetian experimental tasks. *Cognitive Psychology*, 1, 358-387.
- Klahr, D., & Wallace, J. G. (1972). Class inclusion processes. In S. Farnham-Diggory (Ed.), *Information processing in children*. New York: Academic Press.
- Klahr, D., Kriebel, C.H., & Van Horn, R.L. (1972). Design for an educational assembly system. In *Proceedings of International Federation of Information Processing Congress*, 1971. Amsterdam: North Holland Publishing Company.
- Klahr, D., & Wallace, J.G. (1972). Reply to Hayes: On the value of theoretical precision. In S. Farnham-Diggory (Ed.), *Information processing in children* (pp. 185-186). New York: Academic Press.
- Klahr, D. (1973). An information processing approach to the study of cognitive development. In A. Pick (Ed.), *Minnesota symposia on child psychology*, Vol. 7. Minneapolis: University of Minnesota Press.

- Klahr, D. (1973). A production system for counting, subitizing and adding. In W. G. Chase (Ed.), *Visual information processing*. New York: Academic Press.
- Klahr, D. (1973). Quantification processes. In W. G. Chase (Ed.), *Visual information processing*. New York: Academic Press.
- Klahr, D., & Wallace, J. G. (1973). The role of quantification operators in the development of conservation of quantity. *Cognitive Psychology*, 4, 301-327.
- Klahr, D. (1974). Understanding understanding systems: A few comments on papers by Moore & Newell and Reddy & Newell. In L. Gregg (Ed.), *Knowledge and cognition*. Potomac, MD: Lawrence Erlbaum Associates.
- Chi, M.T.H. & Klahr, D. (1975). Span and rate of apprehension in children and adults. *Journal of Experimental Child Psychology*, 19, 434-439.
- Klahr, D. (1976). Steps toward the simulation of intellectual development. In L. B. Resnick (Ed.), *The nature of intelligence*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr, D. (1976). Designing a learner: Some questions. In D. Klahr (Ed.), *Cognition and instruction*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr, D. (1976). The social psychologist as troll. In J.S. Carroll & J.W. Payne (Eds.), *Cognition and social behavior*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr, D. (1977). Information processing in children. In B.B. Wolman (Ed.), *International Encyclopedia of Neurology, Psychiatry, Psychoanalysis and Psychology*. Aesculapius Publishers, Inc.
- Klahr, D. (1978). Raging over stages: Comments on Brainerd's 'The stage question in Developmental Theory'. *The Behavioral and Brain Sciences*, 1, 191-192.
- Klahr, D. (1978). Variations on a scheme: What you learn is what you know. *Contemporary Psychology*, 23, 721-723.
- Klahr, D. (1978). Goal formation, planning, and learning by pre-school problem solvers, or: 'My socks are in the dryer'. In R.S. Siegler (Ed.), *Children's thinking: What develops?* (pp. 181-212). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr, D. (1978). Information processing models of cognitive development. In J. Scandura & C. Brainerd (Eds.), *Structural/process theories of complex human behavior* (pp. 479-518). A.W. Sijthoff International Publishing Company.
- Reprinted as:
- Klahr, D. (1980). Information processing models of cognitive development. In R. Kiewe & H. Spada (Eds.), *Developmental Models of Thinking*. New York: Academic Press.
- Klahr, D. (1981). Informationsverarbeitungsmodelle der Denkentwicklung. In R. Kiewe & H. Spada (Eds.), *Studien zur Denkentwicklung Bern*, Stuttgart, Wein: Huber.
- Klahr, D. (1984). Modelos del Desarrollo Intelectual Basados en el Procesamiento de la Informacion. In M. Carretero & J. A. Garcia Madruga (Eds.), *Lecturas de psicología del pensamiento* Madrid: Alianca Editonaia.
- Klahr, D., & Siegler, R.S. (1978). The representation of children's knowledge. In H. W. Reese & L.P. Lipsitt (Eds.), *Advances in child development, Vol. 12*. New York: Academic Press.
- Klahr, D. (1982). Non-monotone assessment of monotone development: An information processing analysis. In S. Strauss & R. Stavy (Eds.), *U-shaped behavioral growth*. New York: Academic Press.
- Klahr, D., & Robinson, M. (1981). Formal assessment of problem solving and planning processes in preschool children. *Cognitive Psychology*, 13, 113-148.
- Siegler, R.S., & Klahr, D. (1981). When do children learn? The relationship between existing knowledge and the acquisition of new knowledge. In R. Glaser (Ed.), *Advances in instructional psychology, Vol.2*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr, D. (1981). Looking under a different lamppost. Review of Kirby, J.R. & Biggs, J.B. (Eds.) *Cognition, Instruction & Development. Contemporary Psychology*, 26, 843-844.
- Klahr, D., Chase, W. C., & Lovelace, E. (1983). Structure and process in alphabetic retrieval. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 9(3), 462-477.
- Klahr, D. (1984). Transition processes in quantitative development. In R. Sternberg (Ed.), *Mechanisms of Cognitive Development*. San Francisco: W. H. Freeman & Co.
- Klahr, D. (1984). An embarrassment of number: Comments on the origins of number skills. In C. Sophian (Ed.), *Origins of cognitive skills*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Klahr, D. (1985). Cognitive Science and Clinical Practice. *GPPA Report*, 2, 1-2. Greater Pittsburgh Psychological Association.
- Klahr, D. (1985). Insiders, outsiders and efficiency in an NSF Panel. *American Psychologist*, 40, 148-154.

- Klahr, D. (1985). Solving problems with ambiguous subgoal ordering: Preschoolers' performance. *Child Development, 56*, 940-952.
- Carver, S.M., & Klahr, D. (1986). Children's acquisition of debugging skills in a LOGO environment. *Journal of Educational Computing Research, 2*(4), 487-525.
- Carver, C.S., Scheier, M.F., & Klahr, D. (1986). Further explorations of a control-process model of text anxiety. In R. Schwarzer, H.M. van der Ploeg, & C.D. Spielberger (Eds.), *Advances in test anxiety research, Vol. 5*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Shrager, J., & Klahr, D. (1986). Instructionless learning about a complex device. *International Journal of Man-Machine Studies, 25*, 153-189.
- Neches, R., Langley, P., & Klahr, D. (1987). Learning, development and productions systems. In D. Klahr, P. Langley, & R. Neches (Eds.), *Production system models of learning and development*. Cambridge, MA: MIT Press.
- Wallace, J.G., Klahr, D. & Bluff, K. (1987). A self-modifying production system for conservation acquisition. In D. Klahr, P. Langley, & R. Neches (Eds.), *Production system models of learning and development*. Cambridge, MA: MIT Press.
- Klahr, D., & Dunbar, K. (1988). Dual space search during scientific reasoning. *Cognitive Science, 12*(1), 1-55.
- Klahr, D., & Carver, S.M. (1988). Cognitive objectives in a LOGO debugging curriculum: Instruction, Learning, and Transfer. *Cognitive Psychology, 20*, 362-404.
- Dunbar, K., & Klahr, D. (1989). Developmental differences in scientific discovery strategies. In D. Klahr & K. Kotovsky (Eds.), *Complex information processing: The impact of Herbert A. Simon*. Hillsdale, NJ: Erlbaum.
- Klahr, D. (1989). Information processing approaches. In R. Vasta (Ed.), *Annals of Child Development* (pp. 131-185). JAI Press, Inc.  
Republished in: Vasta, R. (Ed.) (1992) *Six Theories of Child Development*. London: Jessica Kingsley Publishers.
- Klahr, D. (1989). A Sears catalog for the developmental psychologist. Review of Bisanz, J., Brainerd, C.J., & Kail, R. [Eds.], 'Formal methods in developmental psychology' New York: Springer-Verlag, 1987. *Contemporary Psychology, 34*(5), 460-462.
- Klahr, D., Dunbar, K. & Fay, A.L. (1990). Designing good experiments to test 'bad' hypotheses. In J. Shrager & P. Langley (Eds.), *Computational models of discovery and theory formation*. San Mateo, CA: Morgan-Kaufman.
- Simon, T., Newell, A., & Klahr, D. (1991). A computational account of children's learning about number conservation. In D. Fisher & M. Pazzani (Eds.), *Concept formation: knowledge and experience in unsupervised learning*. San Mateo, CA: Morgan Kauffman.
- Klahr, D. (1992). Information processing approaches to cognitive development. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental Psychology: An Advanced Textbook, 3rd Edition*. Hillsdale, N.J.: Erlbaum.
- Klahr, D., Fay, A.L., & Dunbar, K. (1993) Developmental differences in experimental heuristics. *Cognitive Psychology, 25*., 111-146.
- Klahr, D.(1994) Plausible models of Alphabetic Search: A reply to Scharroo, Leeuwenberg, Stalmeier, & Vos (1994)*Journal of Experimental Psychology: Learning, Memory, and Cognition. 20* (1).
- Klahr, D. (1994) Searching for Cognition in Cognitive Models of Science. *PSYCOLOQUY 5*(94) scientific-cognition.12.klahr.
- Klahr, D. (1994) Children, adults, and machines as discovery systems *Machine Learning, 14*, 313-320.
- Klahr, D. (1994) Discovering the Present by Predicting the Future In M. Haith, B. Pennington, & J. Benson (Eds.) *The development of future-oriented processes*. Chicago: University of Chicago Press.
- Simon, T. and Klahr, D (1995) A theory of children's learning about number conservation. In T. Simon & G. Halford (Eds.) *Developing cognitive competence: New approaches to process modeling*. Hillsdale, NJ: LEA.
- Klahr, D. (1995) Computational models of cognitive change: the state of the art. In T. Simon & G. Halford (Eds.) *Developing cognitive competence: New approaches to process modeling*. Hillsdale, NJ: Erlbaum.
- Klahr, D. & Carver, S. M. (1995) Scientific Thinking about Scientific Thinking. *Monographs of the Society for Research in Child Development. #245*, vol. 60, no. 4, 137-151.
- Klahr, D. (1996) Comments on "Scientific Reasoning: Developmental and Individual Differences" by Bullock & Ziegler. In F. Weinert & W. Schneider (eds.) *Individual Development from 3 to 12: Findings from the Munich Longitudinal Study*.
- Fay, A. & Klahr, D. (1996) Knowing about guessing and guessing about knowing: Preschoolers' understanding of indeterminacy. *Child Development.*, 67, 689-716.

- Klahr, D. (1996) Scientific Discovery Processes in Children, Adults, and Machines. In D. Steier & T. Mitchell, Eds., *Mind Matters: Contributions to Cognitive and Computer Science in Honor of Allen Newell*. Hillsdale, N.J.: Erlbaum.
- Penner, D. E., & Klahr, D. (1996). When to trust the data: Further investigations of system error in a scientific reasoning task. *Memory & Cognition*, 24 (5), 655-668.
- Penner, D. & Klahr, D. (1996) The Interaction of Domain-Specific Knowledge and Domain-General Discovery Strategies: A Study with Sinking Objects. *Child Development*, 67, 2709-2727.
- Klahr, D. (1996) Cognitive determinants of collaborative ebb and flow. *Bulletin of the Japanese Cognitive Science Society*, 3, 6-7.  
Reprinted in K. Ueda and T. Okada (Eds.) (2000) In search of collaborative cognition: *Cognitive science on creative collaboration*. Kyoritsu Shuppan. Tokyo. (In Japanese)
- Klahr, D., & MacWhinney, B. (1998) Information Processing. In D. Kuhn & R. S. Siegler (Eds.), W. Damon (Series Ed.). *Handbook of child psychology (5th ed.): Vol. 2: Cognition, perception, and language*. New York: Wiley. (pp. 631-678)
- Schunn, C. D., & Klahr, D. (1998). Production systems: Views on intelligent behavior. In W. Bechtel and G. Graham (Eds.), *A Companion to Cognitive Science*. Oxford: Blackwell
- Klahr, D. (1999) The Conceptual Habitat: in What Kind of System Can Concepts Develop? In E. K. Scholnick, K. Nelson, S. A. Gelman, & P. H. Miller, (Eds.) *Conceptual Development: Piaget's Legacy*. Mahwah, NJ: Lawrence Erlbaum Associates, pp. 131 - 161.
- Haverty, L. A., Koedinger, K. R., Klahr, D., & Alibali, M. W. (1999) Solving Induction Problems in Mathematics: Not-so-Trivial PURSUIT. *Cognitive Science*.
- Chen, Z. & Klahr, D., (1999) All Other Things being Equal: Children's Acquisition of the Control of Variables Strategy, *Child Development*, 70 (5), 1098 - 1120.
- Klahr, D. & Simon, H. A. (1999) Studies of Scientific Discovery: Complementary Approaches and Convergent Findings. *Psychological Bulletin*, 125 (5), 524-543 .
- Klahr, D., Chen, Z., & Toth, E. E. (2001) From Cognition to Instruction to Cognition: A Case Study in Elementary School Science Instruction. In Crowley, K., Schunn, C.D., & Okada, T. (Eds.) *Designing for Science: Implications from Professional, Instructional, and Everyday Science*. Mahwah, NJ: Erlbaum
- Toth, E. E., Klahr, D., & Chen, Z. (2000) Bridging Research and Practice: a Cognitively-Based Classroom Intervention for Teaching Experimentation Skills to Elementary School Children. *Cognition & Instruction*, 18 (4), 423-459.
- Klahr, D., Chen, Z., and Toth, E. E. (2001). Cognitive development and science education: Ships passing in the night or beacons of mutual illumination? In Carver, S. M. and Klahr D. (Eds.) *Cognition and Instruction: 25 years of progress*. Mahwah, NJ: Erlbaum
- Klahr, D. & Simon, H. A. (2001) What have psychologists (and others) discovered about the psychology of scientific discovery. *Current Directions in Psychological Science*. 10(3), 75-83
- Klahr, D. & Kotovsky, K. (2001) A life of the mind: Remembering Herb Simon. *APS Observer*, 14,14-33.
- Klahr, D. (2001) Directions to "Eureka!" *Science*, 292, 2009
- Klahr, D. & Masnick, A. M. (2002). Explaining, but not Discovering, Abduction. Review of L. Magnani (2001) *Abduction, Reason, and Science: Processes of Discovery and Explanation*. *Contemporary Psychology*, 47, 740-741.
- Triona, L. M. & Klahr, D. (2003) Point and Click or Grab and Heft: Comparing the influence of physical and virtual instructional materials on elementary school students' ability to design experiments *Cognition & Instruction*, 21, 149-173.
- Carver, S. M. & Klahr, D. (2002). Response to review by Maurice Galton of "Cognition and instruction: Twenty-five years of progress." *British Journal of Educational Psychology*, 72, 449-450.
- Masnick, A. M., & Klahr, D. (2003) Error Matters: An Initial Exploration of Elementary School Children's Understanding of Experimental Error. *Journal of Cognition & Development*, 4, 67-98.
- Klahr, D. & Chen, Z. (2003) Overcoming the "positive capture" strategy in young children: Learning about indeterminacy. *Child Development*, 74, 1256-1277.
- Klahr (2004) Encounters with the force of Herbert A. Simon. In Augier, M. & March, J. G.(Eds.) *Models of a Man: Essays in Memory of Herbert A. Simon*. Cambridge, MA: MIT Press.
- Klahr, D. (2004) New kids on the connectionist modeling block. *Developmental Science*, 7, 165.166.
- Klahr, D. (2004) A framework for cognitive studies of science and technology in M. Gorman, A. Kincannon, D. Gooding, R.D. Tweney & M. Mehalik (Eds.) *New Directions in the Study of Science and Technology*. Mahwah, NJ: Erlbaum

- Klahr, D. & Nigam, M. (2004) The equivalence of learning paths in early science instruction: effects of direct instruction and discovery learning. *Psychological Science*, *15*, 661-667.
- Klahr, D. (2005) Early Science Instruction: Addressing Fundamental Issues. *Psychological Science*, *16*, 871-872.
- Klahr, D. & Li, J. (2005) Cognitive Research and Elementary Science Instruction: From the Laboratory, to the Classroom, and Back. *Journal of Science Education and Technology*, *4*, 217-238.
- Li, J. & Klahr, D. (2006). The Psychology of Scientific Thinking: Implications for Science Teaching and Learning. In J. Rhoton & P. Shane (Eds.) *Teaching Science in the 21<sup>st</sup> Century*. National Science Teachers Association and National Science Education Leadership Association: NSTA Press.
- Triona, L. & Klahr, D. (2006) The development of children's abilities to produce external representations. In J. Dockrell., L. Tolchinsky, & E. Teubal (Eds.), *Development of Notational Representation*. Oxford: Oxford University Press.
- Li, J., Klahr, D., & Jabbour, A. (2006). When the rubber meets the road: Putting research-based methods to test in urban classrooms. *Proceedings of the seventh international conference of the learning sciences: Making a difference*. Mahwah, NJ: Erlbaum.
- Li, J., Klahr, D. & Siler, S. (2006). What Lies Beneath the Science Achievement Gap? The Challenges of Aligning Science Instruction with Standards and Tests. *Science Educator*, *15*, 1-12.
- Klahr, D., Triona, L. M., & Williams, C. (2007) Hands On What? The Relative Effectiveness of Physical vs. Virtual Materials in an Engineering Design Project by Middle School Children. *Journal of Research in Science Teaching*, *44*, 183-203
- Masnack, A. M., Klahr, D., & Morris, B. J. (2007) Separating signal from noise: Children's understanding of error and variability in experimental outcomes. In M. Lovett & P. Shaw, P. (Eds) *Thinking With Data*. Mahwah, NJ: Erlbaum.
- Klahr, D. (2007) Evolution of Scientific Thinking: Comments on Geary's "Educating the Evolved Mind" In Carlson, J. & Levin, J. (Eds.) *Psychological Perspectives on Contemporary Educational Issues*. Greenwich, CT. Information Age Publishing
- Triona, L. & Klahr, D. (2008) "Hands-on science: Does it matter what the student's hands are on in 'hands-on science'? *The Science Education Review*.
- Chen, Z. & Klahr, D., (2008) Remote Transfer of Scientific Reasoning and Problem-Solving Strategies in Children. In R. V. Kail (Ed.) *Advances in Child Development and Behavior*, Vol. 36. (pp. 419 – 470) Amsterdam: Elsevier
- Strand-Cary, M. & Klahr, D. (2008). Developing Elementary Science Skills: Instructional Effectiveness and Path Independence. *Cognitive Development*, *23*, 488–511.
- Klahr, D., Triona, L., Strand-Cary, M., & Siler, S. (2008) Virtual vs. Physical Materials in Early Science Instruction: Transitioning to an Autonomous Tutor for Experimental Design. In Jörg Zumbach, Neil Schwartz, Tina Seufert and Liesbeth Kester (Eds) *Beyond Knowledge: The Legacy of Competence Meaningful Computer-based Learning Environments*. SpringerLink.
- Klahr, D. (2009) "To every thing there is a season, and a time to every purpose under the heavens": What about Direct Instruction? In S. Tobias and T. M. Duffy (Eds.) *Constructivist Theory Applied to Instruction: Success or Failure?* Taylor and Francis.
- Newcombe, N. S., Ambady, N., Eccles, J., Gomez, L., Klahr, D., Linn, M., Miller, K., & Mix, K. (2009) Psychology's Role in Mathematics and Science Education. *American Psychologist*, Vol. 64, No. 6, 538–550
- Klahr, D. (in press) Patterns, Rules, & Discoveries in Life and in Science. In Carver, S., & Shrager, J. (Eds.) *The Journey From Child to Scientist: Integrating Cognitive Development and the Education Sciences*. Washington DC: American Psychological Association
- Siler, S. & Klahr, D. (in press) Detecting, Classifying and Remediating Children's Explicit and Implicit Misconceptions about Experimental Design. In Proctor, R. W., & Capaldi, E. J. (Eds.), *Psychology of Science: Implicit and Explicit Processes*. New York: Oxford University Press.
- Klahr, D. & Chen, Z. (2011) Finding one's place in transfer space. *Child Development Perspectives*, *5*, 196 - 204
- Dunbar, K. & Klahr, D. (in press) Scientific thinking and reasoning. In, Keith Holyoak (Ed.) *Oxford Handbook of Thinking and Reasoning*. Oxford University Press.
- Matlen, B. & Klahr, D. (under review) Sequential Effects of High and Low Instructional Guidance on Children's Acquisition and Transfer of Experimentation Skills. *Cognitive Science*.

## PAPERS &amp; PRESENTATIONS

- Davenport, J. L., Klahr, D. & Koedinger (2007). The influence of diagrams on chemistry learning. Paper presented at the 12th Biennial Conference of the European Association for Research on Learning and Instruction in Budapest, Hungary.
- Davenport, J. L., McEldoon, K. & Klahr, K. (2007, August). Depicting invisible processes: The influence of molecular-level diagrams in Chemistry instruction. Poster presented at the Twenty-ninth Annual meeting of the Cognitive Science Society. Nashville, TN. 2007
- Davenport, J. L., Yaron, D., Karabinos, M., Klahr, K. & Koedinger, K. (2007, June). Chemical equilibrium: an evaluation of a new type of instruction. Poster presented at the Gordon Conference for Chemistry Education Research and Practice. Lewiston, ME. 2007
- Davenport, J. L., Yaron, D., Klahr, D., & Koedinger, K. (2008). Development of conceptual understanding and problem solving expertise in chemistry. In V. Sloutsky, B. Love, & K. McRae (Eds.) Proceedings of the Thirtieth Annual Conference of the Cognitive Science Society. pp. 751-756. Cognitive Science Society.
- Davenport, J. L., Yaron, D., Klahr, D., & Koedinger, K. (2008). When do diagrams enhance learning? A framework for designing relevant representations. Proceedings of the 2008 International Conference of the Learning Sciences. Utrecht, Netherlands.
- Klahr, D., Li, J., Strand Cary, M., Siler, S. & Triona, L. (2007). *On the Importance of Defining Before Maligning*. Invited presentation in Symposium: "Can Science Assessments Promote Inquiry Learning?" Annual Meeting of the American Association for the Advancement of Science (AAAS), San Francisco, CA Feb 2007
- Klahr, D., & Chen, Z. (2007) *Remote Transfer of Scientific Reasoning and Problem-Solving Strategies in Children and Adults*. Presentation at Symposium on Learning and Transfer: Application of Developmental Psychology Research to Educational Issues. SRCD 2007 Biennial Meeting. Boston, MA March 2007

## RECENT INVITED TALKS

- First Annual Conference: Society for Research on Educational Effectiveness (SREE) Lansdowne Conference Center, Lansdowne, VA Dec 2006
- Seminar Series on Developmental Science and Early Schooling. Frank Porter Graham Child Development Institute. University of North Carolina, Chapel Hill, NC March 2007
- Invited Master Lecture: SRCD 2007 Biennial Meeting. Boston, MA March 2007
- Invited Presidential Symposium, Cognitive Development Society Biennial Meeting. Santa Fe, NM. October, 2007.
- Psychology Department Colloquium Series, University of Virginia, September, 2008.
- Psychology & Education Colloquium Series, University of Miami, December, 2008.
- Distinguished guest speaker, Conference on Cognitive Science and Education, The International School for Advanced Studies (SISSA), Trieste, Italy, January 2009.
- Graduate School Distinguished Speaker, University of Wyoming, April, 2009.
- Invited Guest Speaker, Annual Meetings of the Council of Scientific Society Presidents, Washington, DC, May 2009.
- Invited Speaker: Purdue University Conference on the Psychology of Science: Implicit and Explicit Reasoning (June, 2010).
- Keynote address at the Biennial Conference of the International Society for the Psychology of Science and Technology, UC Berkeley, August 2010,
- Invited -- by the Search Committee for the Cowan Chair in Human Social Dynamics -- to present a series of talks at the Santa Fe Institute (September, 2010).
- Invited participant Fordham Conference on Video Games and Cognitive Development (sponsored by NSF), Fordham University, New York, Oct. , 2010
- Invited participant Spencer Foundation conference on "What Children Learn in School", Chicago, Oct. , 2010
- Invited participant, APA's Science Leadership Conference, Washington, DC, November, 2010
- Invited opening speaker. Society for Research in Educational Effectiveness, Washington, DC., Sept 2011

### Brief Biography

David Klahr is the Walter van Dyke Bingham Professor of Cognitive Development and Education Sciences at Carnegie Mellon University. He received his undergraduate degree in 1960 from MIT in Electrical Engineering, and his Ph.D. in 1968 from Carnegie Mellon's Graduate School of Industrial Administration (GSIA) in Organizations and Social Behavior. From 1967-69, he was an Assistant Professor at the University of Chicago with a joint appointment in the School of Business and the Department of Mathematics. He returned to Carnegie Mellon with a joint appointment in GSIA and Psychology in 1969, and became Professor of Psychology in 1976. He served as Head of Department of Psychology from 1983 to 1993.

Klahr's early research focused on the analysis of complex cognitive processes in such diverse areas as voting behavior, college admissions, consumer choice, peer review, problem solving and scientific reasoning. He pioneered the application of information processing analysis and computer simulation models to questions of cognitive development. Dr. Klahr's most recent research efforts have focused on the thinking processes that support children's understanding of the fundamental principles underlying scientific thinking. This work includes both basic research with pre-school children and more applied classroom studies of how children learn about experimental science. He has worked in a wide variety of schools in the Pittsburgh region, focusing on children's ability to learn how to design and interpret simple experiments.

In addition to approximately 100 journal articles and conference publications, Klahr is the author of two books - *Cognitive Development: an Information Processing View* (Erlbaum, 1976, with J. G. Wallace) and *Exploring Science: the Cognition and Development of Discovery Processes* (MIT Press, 2000) and editor or co-editor of four volumes: *Cognition & Instruction* (Erlbaum, 1976), *Production system models of learning and development* (MIT Press, 1987, with P. Langley and R. Neches) and *Complex information processing: The impact of Herbert A. Simon* (Erlbaum, 1989, with K. Kotovsky), and *Cognition & Instruction: 25 years of Progress* (Erlbaum, 2001, with Sharon Carver). His recent research on the development of problem-solving and scientific reasoning skills is reported in *Cognitive Development, Cognitive Psychology, Cognitive Science, Cognition & Instruction, Child Development, Journal of Research on Science Teaching, and Psychological Science*, among others.

Dr. Klahr is member of the National Academy of Education, a Fellow of the American Psychological Association, a Charter Fellow of the American Psychological Society, an Inaugural Fellow of the American Educational Research Association, and a Member of the Society for Research in Child Development and the Cognitive Science Society. He has served on the editorial boards of several cognitive science journals, as well as on the NSF's subcommittee on Memory and Cognitive Processes, and the NIH's Human Development and Aging Study Section, and several review panels for the Institute of Education Sciences. In recent years he has served on three different committees of the National Academy of Science: the Committee on the Foundations of Assessment, the Committee on Research in Education, and the Committee on Science Learning, Kindergarten through Eighth Grade.