CURRICULUM VITAE

Jim Davies   October 9, 2009

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Education

Ph.D. Computer Science (2004)
Georgia Institute of Technology
Thesis: Visual Analogical Problem Solving
Advisors: Profs. Ashok K. Goel and Nancy J. Nersessian
Committee: Profs. Ronald W. Ferguson, Richard Catrambone
Certificate: Cognitive Science

M.S. Psychology (1997)
Georgia Institute of Technology
Thesis: Correlation and Consistent Contrast Biases Shown in Free Sort Categorization
Advisor: Dr. Dorrit O. Billman

B.A. Philosophy (1993)
State University of New York College at Oswego

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Employment
    a)   *Academic employment*

Fall 2006 – Present
Carleton University, Institute of Cognitive Science
Assistant Professor

Fall 2004 – 2006
Queen's University, School of Computing
Postdoctoral Fellow
Supervisor: Prof. Janice Glasgow

Fall 2001 – 2004
Georgia Institute of Technology
Graduate Research Assistant
Supervisors: Profs. Nancy J. Nersessian and Wendy C. Newstetter

1997 – 1998
Georgia Institute of Technology
Graduate Research Assistant
Supervisor: Prof. Janet L. Kolodner

1995 - 1996
Georgia Institute of Technology
Graduate Research Assistant
Supervisor: Prof. Dorrit O. Billman

b)   Other employment

Summer 2000
Mitsubishi Industrial Research Labs
Research Intern
Supervisor: Dr. Charles Rich

Summer 1997
Los Alamos National Laboratory
Graduate Research Assistant
Supervisor: Dr. Mark Galassi

1994-1995
Los Alamos National Laboratory
Graduate Research Assistant
Supervisor: Dr. Timothy J. Thomas

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Current Research Interests

My current research focuses on regularities in human imagination. For example, visualizing rectangles, people tend to imagine them with a flat side (rather than a point) facing down. I approach cognitive science through artificial intelligence: I create computer models of visualization. My goal is to create a computer program that imagines visual scenes the same way people do, with the same content in the same places.

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Publications

Books

Galassi, M., Davies, J., Theiler, J., Gough, B., Jungman, G., Booth, M. & Rossi, F. (2003) *GNU Scientific Library – Second Edition.* Network Theory Ltd.

Galassi, M., Davies, J., Theiler, J., Gough, B., Jungman, G., Booth, M. & Rossi, F. (2001) *GNU Scientific Library.* Network Theory Ltd.

Chapters in edited books

Goel, A. K. & Davies, J. (forthcoming 2010). Artificial Intelligence. In S. B. Kaufman and R. Sternberg (Eds.) *Cambridge Handbook of Intelligence* (3rd Edition).

Nersessian, N. J., Kurz-Milcke, E. & Davies, J. (2005). Ubiquitous computing in science and engineering labs: A case study of a biomedical engineering lab. In G. Kouzelis, M. Pournari, M. Stoeppler and V. Tselfes, (Eds.), *Knowledge in the New Technologies*. Peter Lang: Berlin: 167--195.

Davies, J. R. (2001). Ocelots are endangered South American wild cats. In J. Ohler (Ed.) *Future Courses: A Compendium of Thought About the Future of Technology and Education.* Technos Press. 79—83.

Articles in refereed journals

Gagné, J. & Davies, J. (in press) Visuo: A model of visuospatial instantiation of quantitative magnitudes. *Knowledge Engineering Review. Special Issue on Visual Reasoning.*

Davies, J., Goel, A. K., & Nersessian, N. J. (2009). A Computational Model of Visual Analogies in Design. *Cognitive Systems Research: Special Issue on Analogies*, 10, 204--215.

Davies, J., Goel, A. K. & Yaner, P. W. (2008). Proteus: Visuospatial analogy in problem-solving. *Knowledge-Based Systems.* 27(7), 636-654.

Davies, J., Goel, A. K. (2008). Visual representations and re-representation in analogical reasoning. *The Open Artificial Intelligence Journal*, 2, 11-20.

Davies, J., Goel, A. K. (2007). Transfer of Problem-Solving Strategy Using Covlan. *Journal of Visual Languages and Computing*: 18, 149--164.

Glasgow, J., Kuo, T. & Davies, J. (2006). Protein structure from contact maps: A case-based reasoning approach. *Information Science Frontiers, Special Issue on Knowledge Discovery in High-Throughput Biological Domains*. 8: 29—36

Davies, J., Glasgow, J. & Kuo, T. (2006). Visio-spatial case-based reasoning: A case study in prediction of protein structure. *Computational Intelligence*, 22:3/4, 194--207.

Billman, D. O. & Davies, J. (2005). Consistent contrast and correlation in free sorting. *American Journal of Psychology*. 118(3) 353--383

Davies, J., Nersessian, N. J. & Goel, A. K. (2005). Visual models in analogical problem solving. *Foundations of Science*, *Special Issue on Model-Based Reasoning: Visual,*

Analogical, Simulative. L. Magnani & N. J. Nersessian (Eds.) 10, 133-152.

Formally Refereed Abstracts

Abelson, A., Davies, J., Fraser, R., Kuo, T., Zuviria, E. & Glasgow, J. (2005). Protein structure from contact maps: An hierarchical approach. Intelligent Systems for Molecular Biology (ISMB05).

Articles in refereed conference proceedings

Davies, J. & Gagné, J. (2009). Analogical estimation of quantitative magnitudes. New Frontiers of Analogy Research: Proceedings of Analogy 09, 155-164, Sophia, Bulgaria.

Thomson, R. & Davies, J. (2009). Distance estimation as a process of generating Ad-Hoc Metrical Systems. *Proceedings of the Thirty-First Annual Conference of the Cognitive Science Society.*

Davies, J. (2009). Experience-based reasoning as the basis of a general artificial intelligence architecture. *IJCAI Workshop on Grand Challenges for Reasoning from Experiences.* Pasadena, California, July 11, 2009.

Davies, J., Glasgow, J. & Kuo, T. (2007). Protein structure prediction with visuospatial analogy. In T. Barkowsky, C. Freksa, M. Klnauff, & B. Krieg-Bruckner (Eds.) *Proceedings of Spatial Cognition 2006*, Bremen, Germany.

Davies, J., Goel, A. K. & Nersessian, N. J. (2005). A Cognitive Model of visual analogical problem-solving transfer. Poster paper in L. P. Kaelbling & A. Saffioti (Eds.) *Proceedings of the Nineteenth Annual International Joint Conference On Artificial Intelligence*. Professional Book Center, Denver, Colorado. 1556--1557.

Davies, J., Goel, A. K. & Nersessian, N. J. (2005). Transfer in visual case-based problem-solving. In H. Munoz-Avila & F. Ricci (Eds.) *Proceedings of the 6th International Conference on Case-Based Reasoning*. LNAI 3620. Springer-Verlag. Berlin Heidelberg. 163--176.

Davies, J., Goel, A. K. & Nersessian, N. J. (2005). Transfer of problem-solving strategy using the Cognitive Visual Language. *Proceedings of the International Workshop on Visual Languages and Computing (VLC05)*. 293--298.

Nersessian, N. J., Kurz-Milke, E., Newstetter, W. C. & Davies, J. (2004). Research laboratories as evolving distributed cognitive systems. In A. Markman & L. Barsalou (Eds.) *Proceedings of the 25th Annual Conference of the Cognitive Science Society*. Erlbaum. Hillsdale, New Jersey. 857--862.

Davies, J. & Goel, A. K. (2004). Representation Issues in visual analogy. In R. Alternam & D. Kirsh (Eds.) *Proceedings of the 25th Annual Conference of the Cognitive Science*

Society. Erlbaum. Hillsdale, New Jersey. 300-305.

Davies, J., Goel, A. K., & Nersessian, N. J. (2003). Visual re-representation in creative analogies. In A. Cardoso & J. Gero (Eds.) *The Third Workshop on Creative Systems, International Joint Conference on Artificial Intelligence*.

Davies, J. & Goel, A. K. (2003). Visual case-based reasoning I: Transfer and adaptation. *Proceedings of the First Indian International Conference on Artificial Intelligence*. Hyderabad, India.

Nersessian, N. J., Newstetter, W. C., Kurz-Milcke, E. & Davies, J. (2002). A Mixed-method Approach to Studying Distributed Cognition in Evolving Environments. *Proceedings of the International Conference on Learning Sciences*. pp. 307--314.

Davies, J., & Goel, A. K. (2001). Visual analogy in problem solving. *Proceedings of the International Joint Conference on Artificial Intelligence*. pp 377-382. Morgan Kaufmann publishers.

Davies, J. R., Lesh, N., Rich, C., Sidner, C. L., Gertner, A. S., & Rickel, J. (2001). Incorporating tutorial strategies into an intelligent assistant. Proceedings of the 2001 *International Conference on Intelligent User Interfaces*.

Davies, J. R., Nersessian, N.J. & Goel, A.K. (2001). The role of visual analogy in scientific discovery. *Model-Based Reasoning: Scientific Discovery, Technological Innovation, Values.* Pavia Italy.

Murdock, W. J., Simina, M., Davies, J., & Shippey, G. (1998). Modeling Invention by Analogy in ACT-R. *Proceedings of the Twentieth Annual Conference of the Cognitive Science Society*, Madison, WI.

Published technical reports

Davies, J. (2009). Don't waste student work: Using classroom assignments to contribute to online resources. Carleton University Cognitive Science Technical Report 2009-01, http://www.carleton.ca/ics/TechReports

Davies, J., Nersessian, N. J., Goel, A. K. (2001). Visual models in analogical problem solving. Georgia Institute of Technology Cognitive Science technical report GIT-COGSCI-2001/03.

Davies, J. R., Lesh, N., Rich, C., Sidner, C. L., Gertner, A. S., Rickel, J. (2000). Incorporating tutorial strategies into an intelligent assistant. Mitsubishi Electric Research Labs. Technical report TR-2000-30. Cambridge, MA.

Davies, J. R., Goel, A. K., Murdock, J. W., Simina, M., Shippey, G. (2000). Three Cognitive Models. Georgia Institute of Technology Cognitive Science Report Series

GIT-COGSCI-2000/03. Atlanta, Georgia.

Davies, J. (1998) Correlation and consistent contrast biases shown in free sort categorization. Georgia Institute of Technology Cognitive Science Report Series GIT-COGSCI-98/02. Atlanta, Georgia.

Creative writing

Davies, J. (2007). This City Was Made For Us. Poetry in *Bywords*, December, 2007.

Editorial Responsibilities

Reviewer for
 Journals
  Journal of Cognitive Systems Research
  Software Practice and Experience
  Journal of Digital Information
  Journal of Human-Computer Interaction
 Conferences
  Annual Conference of the Cognitive Science Society

Programme committee membership
 Analogy 09
 Diagrams 2010
  Graduate Symposium Chair

Papers Presented
 a) *to learned societies*

Schoenherr, J.R., Davies, J., Burch, H., Thomson, R. (2009). The believability of anthropomorphic explanations. Poster presentation at the 31st Annual Conference of the *Societe Quebecoise Pour La Recherche En Psychologie (SQRP09)*. Ottawa, Ontario, March 22, p151.

Davies, J., Schoenherr, J.R., Thompson, R. & Burch, H. (2009). Visuospatial Imagination of Geometric Shape: Regularities and Inconsistencies. Poster and Member apstract in the *Proceedings of the Cognitive Science Society.*

Davies, J., Schoenherr, J.R., & Bell, J. (2009). Psychological Dimensions of Graphical Representation of Science. *2009 Annual Convention of the Canadian Psychological Association,* June 11 – 13, Montréal, Québec.

Schoenherr, J.R., Davies, J., & Burch, H. (2009). Regularities in Human Visuospatial Imagination. *2009 Annual Convention of the Canadian Psychological Association,* June

11 – 13, Montréal, Québec.

Burch, H., Davies, J., & Schoenherr, J.R. (2009). The believability of anthropomorphic explanations. *2009 Annual Convention of the Canadian Psychological Association,* June 11 – 13, Montréal, Québec.

> *b)*   *to other academic bodies*

Davies, J., & Gagné, J. (2009). Visuo: A Model of Visuospatial Instantiation of Quantitative Magnitudes. Carleton University Cognitive Science Colloquium Series, October 8.

Davies, J. (2009). Don't waste student work: Using class assignments to further research and wider educational goals. Carleton University Educational Development Centre Teaching Technology Roundtable, September 25.

Schoenherr, J. R. & Davies, J. (2009). Complexity Effects in Judgments of Maps of Science. *The 12th International Converence on Scientometrics and Infometrics.* Rio de Janiero, Brazil.

Davies, J. (2007). A.I. past and future. *Institute on Biotechnology and the Human Future's (IBHF) Conference, "The Spotless Mind? Policy, Ethics & the Future of Human Intelligence,"* February 16: The National Press Club, Washington, D.C. http://www.thehumanfuture.org/events/webcast_021607.html

Davies, J. (2006). *The role of visual reasoning in analogical problem solving*.
     University of California at Merced. February 16.
     Institute of Cognitive Science, Carleton University. February 13.

Abelson, A., Davies, J., Fraser, R., Kuo, T., Zuviria, E. & Glasgow, J. (2006). Protein structure from contact maps: An hierarchical approach. Poster at First Canadian Student Conference on Biomedical Computing (CSCBC06). Kingston, Ontario.

Davies, J. (2006) Visualization in Human Imagination. HOT Lab presentation. Carleton University. December 1.

Davies, J. (2006) Visualization in Human Imagination. Cognitive Science Colloquium Series. Carleton University. October 13.

Davies, J. (2004). Constructive adaptive visual analogy. Cognitive Science Student Conference. Georgia Institute of Technology. April 23.

Davies, J. (2004). *Constructive adaptive visual analogy*.
     School of Information Science & Learning Technologies, U of Missouri. May 19.
     School of Computing, Queen's University. May 13.
     University College Dublin. April 27.

University of Wisconsin at Green Bay. March 24.

Nersessian, N. J., Newstetter, W. C., Kurz-Milcke, E., Davies, J. & Malone, K. (2003) Laboratory learning: Cognition and learning in biomedical engineering labs. NSF Presentation.

Newstetter, W. C., Nersessian, N. J., Davies, J., Kurz, E. & Malone, K. (2002) Biomedical Engineering Thinking and Learning: Phase 1--Reasoning in the lab. NSF presentation.

Davies, J., Nersessian, N. J. & Goel, A. K. (2001). Visual analogy in scientific discovery. *Cognitive Studies of Science and Technology Workshop*, University of Virginia, March 24-27.

Davies, J.R., Lesh, N., Rich, C., Sidner, C.L., Gertner, A.S., & Rickel, J. (2001). Demonstration of collaborative interface agents using COLLAGEN. The 2001 *International Converence on Intelligent User Intervaces.*

Davies, J. (1999). An evaluation of SIRRINE2 as a cognitive architecture based on a model of human arithmetic. Twenty-first Annual Conference of the Cognitive Science Society, Vancouver, BC.

Galassi, M., Davies, J., Theiler, J., Gough, B., Priedhorsky, R., Jungman, G., & Booth, M. (1999). The GNU scientific library. October 1999, *Open Source/Open Science Conference*, Brookhaven National Laboratory.

Billman, D., Davila, D. & Davies, J. (1996). Hierarchy and consistent contrast aid supervised and unsupervised concept learning. November 1996, Accepted talk, *Conference of the Psychonomics Society*.

Davies, J. & Billman D. (1996) Hierarchical categorization and the effects of contrast inconsistency in an unsupervised learning task. Proceedings of the Eighteenth Annual Conference of the Cognitive Science Society. Lawrence Erlbaum, Mahwah, NJ. p.750.

Other Important Forms of Scholarly Productivity

Research Grants
a)   *Government or extra-university*

Davies, J. (2009). *Visuospatial Scene Generation.* National Science and Engineering Research Counsel (NSERC) Discovery Grant. $95,000 CAD ($19,000 per year for five years).

Davies, J. (2008). *Graphical Representations of Scientific Inter-relationships*. SciTech Strategies, Inc. grant. $10,765 USD.

Ferres, L. & Davies, J. (2006). Interaction between Linguistic & Visual Cues During Graph Comprehension Tasks. Statistics Canada. $18,000 CDN.

Davies, J., Essa, I., & Maple, T. (1998-1999) The Primatech project: An interactive simulation of a signing orangutan. Seed Grant. GVU, Georgia Institute of Technology.

b)   University

Davies, J. (2008). *Toward a Theory of Visual Instantiation.* Carleton University Internal Research Grant from the NSERC General Research Fund. $7,000 CAD.

Davies, J. (2007). *Toward a Theory of Visual Instantiation.* Carleton University Internal Research Grant from the NSERC General Research Fund. $5,000 CAD.

(2006) Carleton University Faculty of Arts and Social Sciences Startup Grant. $30,000

Service to the Profession
a)   Other

Editor of *Cognitive Science Summaries* website:
URL: http://www.jimdavies.org/summaries/

Editor of *Brain Areas Mnemonics Wiki* website:
URL: http://brainareas.pbwiki.com/

Consultancies and Contract Research

Academic Responsibilities

a)   Graduate courses taught

[CGSC6800] Proseminar in Cognitive Science
Carleton University
Instructor
Winter 2007, 2008, Fall 2008, 2009

[CGSC 5001] Artificial Intelligence for Cognitive Science
Carleton University
Instructor
Fall, 2008, 2009

[CGSC 4001/5001] Special Topics in Cognitive Science
Carleton University

Instructor
Fall 2006, 2007

b) *Undergraduate courses taught*

[CGSC 4001] Artificial Intelligence for Cognitive Science
Carleton University
Instructor
Winter, 2009

[CGSC 2002]
Theories and Methods in Cognitive Science
Carleton University
Instructor
Winter 2007, 2008, 2009

[CISC 453] Advanced Artificial Intelligence
Queen's University
Instructor (one-third)
Spring 2006

c) *Supervision - Ph.D.*

Janine Fitzpatrick (dissertation supervision, 2009-present)

Sterling Somers (dissertation supervision, 2009-present)

Korey MacDougall (dissertation supervision, 2009-present)

Wendy-Ann Deslauriers (methodology rotation supervision, 2006-2008)

Neal LaBlanc (dissertation supervision, 2007-present)

Robert Thomson (dissertation supervision, 2006-present)

Kam Kwok (dissertation supervision, 2008-present)

Jolie Bell (dissertation supervision, 2008-present)

Manuel Alvarez Cos (dissertation supervision, Fall 2007)

Jobina Li (dissertation supervision, 2006-2007)

- Fourth-year Honours Theses Supervision

Alexander Miller, 2009
    Title: *Rethinking Machine Ethics: Functionally Defined Artificial Intelligent Agent Ethics*

Jonathan Gagne, 2008
    Title: *Analogical Inference of Visual Properties*

Tyler Mair, 2008
    Title: *Finding Fun: Examining the Source of Fun in Games*

James MacAuley (in progress)

Nicolas DiNoia (in progress)

Geoffrey Johnson (in progress)

- Other Research Students

Paid Undergraduates
    Dina Tsirlin (2009-Present)

    Jessica Cockbain (2009-Present)

    Jennifer Cox (2008-2009)

    Heather Burch (2007-2009)

Paid Graduate Students
    Jordan Schoenherr (2007-Present)

    Cesar Astudillo (2009-Present)

Volunteer Undergraduates
    Artem Tsvetkov (2007-2008)

    Velian Pandeliev (2007-2008)

    Connor Smith (2007-Present)

    Iva Nedeleva (2007-Present)

    Shaista Mohammadi (2006-Present)

Mark Fortney (2006-Present)

Robert Bertschi (2005-2006)

d)   ***Theses examined for other departments at Carleton***

Alexander Miller 2009 (BA, Honours)

Jordan Schoenherr 2008 (MS, Psychology)

Michael Henighan 2008 (MS, Psychology)

Joey Theberge 2008 (BA, Honours)

Jonathan Gagne 2008 (BA, Honours)

Administrative Responsibilities at Carleton
a)   ***Department***

Technical Report Manager (2009-Present)

Graduate Committee (2009)

OGS Appraisal Committee (2009)

Member, Institute of Cognitive Science Faculty Hiring Committee (2008-2009)

Member, Institute of Cognitive Science Graduate Admissions Committee (2009)

Cognitive Science / Psychology Promotion Committee (2008-2009)

Cognitive Science / Linguistics Promotion Committee (2008-2009)

Faculty calls to high school students, Carleton University (2008)

Speaker, Annual March Break Program, Pitch to high school students (2007-2008)

Member, Faculty of Arts and Social Sciences Tenure Review Committee (2007)

Member, Institute of Cognitive Science Director Search Committee (2007)

Cognitive Science Distinguished Lecture Series, coordinator,
(Fall 2006 – Summer, 2009)

b)   *Faculty*

Member, Faculty of Arts and Social Sciences Promotion Review Committee
2008