Lecture Notes in Artificial Intelligence 5223

Edited by R. Goebel, J. Siekmann, and W. Wahlster

Subseries of Lecture Notes in Computer Science

Gem Stapleton John Howse John Lee (Eds.)

Diagrammatic Representation and Inference

5th International Conference, Diagrams 2008
Herrsching, Germany, September 19-21, 2008
Proceedings

With 13 Color Figures

Springer

Series Editors

Randy Goebel, University of Alberta, Edmonton, Canada
Jörg Siekmann, University of Saarland, Saarbrücken, Germany
Wolfgang Wahlster, DFKI and University of Saarland, Saarbrücken, Germany

Volume Editors

Gem Stapleton
Computing, Mathematical and Information Sciences
University of Brighton
Brighton, UK
E-mail: G.E.Stapleton@brighton.ac.uk

John Howse
Computing, Mathematical and Information Sciences
University of Brighton
Brighton, UK
E-mail: John.Howse@brighton.ac.uk

John Lee
Human Communication Research Centre
University of Edinburgh
Informatics Forum
Edinburgh, Scotland, UK
E-mail: J.Lee@ed.ac.uk

Library of Congress Control Number: 2008934909

CR Subject Classification (1998): I.2, D.1.7, G.2, H.5, J.4, J.5

LNCS Sublibrary: SL 7 – Artificial Intelligence

ISSN 0302-9743
ISBN-10 3-540-87729-0 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-87729-5 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springer.com

© Springer-Verlag Berlin Heidelberg 2008
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12525874 06/3180 5 4 3 2 1 0

Preface

Diagrams is an international and interdisciplinary conference series, covering all aspects of research on the theory and application of diagrams.

Recent technological advances have enabled the large-scale adoption of diagrams in a diverse range of areas. Increasingly sophisticated visual representations are emerging and, to enable effective communication, insight is required into how diagrams are used and when they are appropriate for use. The pervasive, everyday use of diagrams for communicating information and ideas serves to illustrate the importance of providing a sound understanding of the role that diagrams can, and do, play. Research in the field of diagrams aims to improve our understanding of the role of diagrams, sketches and other visualizations in communication, computation, cognition, creative thought, and problem solving. These concerns have triggered a surge of interest in the study of diagrams.

The study of diagrammatic communication as a whole must be pursued as an interdisciplinary endeavour. Diagrams 2008 was the fifth event in this conference series, which was launched in Edinburgh during September 2000. Diagrams attracts a large number of researchers from virtually all related fields, placing the conference as a major international event in the area.

Diagrams is the only conference that provides a united forum for all areas that are concerned with the study of diagrams: for example, architecture, artificial intelligence, cartography, cognitive science, computer science, education, graphic design, history of science, human-computer interaction, linguistics, logic, mathematics, philosophy, psychology, and software modelling. We see issues from all of these fields discussed in the papers collected in the present volume.

For the 2008 conference, no preferred theme was specified, with the result that the interdisciplinary range was perhaps broader than ever. Contributions were solicited in the categories long paper, short paper and poster. Submissions were received representing both academia and industry, from 24 countries. Of 70 papers submitted, 25 were accepted for either long or short presentations, an acceptance rate of 36%, demonstrating that the conference continues to offer an outlet as high in quality as it is unique in breadth. This year, a substantial number of posters contributed to the range of work presented. All submissions were reviewed by members of the large and distinguished International Program Committee, or by reviewers that they nominated. The papers and posters were augmented by three highly distinguished keynote presentations—perfectly representing both the quality and breadth of the conference as a whole—and two excellent tutorials.

For the first time in its history, Diagrams was co-located, running in conjunction with the IEEE Symposium on Visual Languages and Human-Centric Computing and the ACM Symposium on Software Visualization, as part of Visual Week. This co-location provided a lively and stimulating environment, enabling

researchers from related communities to exchange ideas and more widely disseminate research results. The program featured joint keynote speakers (including Wilhelm Schäfer), and joint sessions (including the papers under "Diagram Aesthetics and Layout" in this volume).

Any successful conference depends on the efforts of a large team of people, and Diagrams is no exception. The hard work of the Program Committee is paramount in ensuring the quality and substance of the conference, and we are greatly indebted to their dedication and generosity with their time. This volume is evidence of the important support of our publishers, Springer, and especially Ursula Barth. Barbara Wirtz of the *Haus der bayerischen Landwirtschaft* provided invaluable assistance with the conference venue. As noted, Diagrams 2008 was co-located with Visual Week, but also very nearly with the celebrated Munich Oktoberfest! There was therefore an exceptional effort by Local Chair Mark Minas and his team, including Steffen Mazanek, Sonja Maier (who oversaw Oktoberfest arrangements), and Florian Brieler (who created the registration Web page). Alan Blackwell helped greatly with finding the Diagrams tutorials.

Sponsors are vital to any successful conference, and we are delighted to acknowledge the generous support of the Cognitive Science Society, for the Best Student Paper award, and Nokia for providing two N810s as Best Paper prizes as well as financial support.

Finally, we would like to thank all of the organizers mentioned on the following pages, and our own institutions, the University of Brighton and the University of Edinburgh. We are especially grateful for the indispensable assistance of our administrator, Carol Suwala in Brighton.

July 2008

Gem Stapleton
John Howse
John Lee

Conference Organization

General Chair

Gem Stapleton	University of Brighton, UK

Program Chairs

John Howse	University of Brighton, UK
John Lee	University of Edinburgh, UK

Local Chair

Mark Minas	Universität der Bundeswehr, Germany

Publicity Chair

Andrew Fish	University of Brighton, UK

Website and Technical Support

Aidan Delaney	University of Brighton, UK

Sponsoring Organizations

Nokia
Cognitive Science Society

Program Committee

Gerard Allwein	Naval Research Laboratory, USA
Michael Anderson	University of Hartford, USA
Dave Barker-Plummer	Stanford University, USA
Alan Blackwell	Cambridge University, UK
Dorothea Blostein	Queen's University, Canada
B. Chandrasekaran	Ohio State University, USA
Peter Cheng	University of Sussex, UK
Phil Cox	Dalhousie University, Canada
Richard Cox	University of Sussex, UK
Frithjof Dau	University of Wollongong, Australia

Max J. Egenhofer	University of Maine, USA
Stephanie Elzer	Millersville University, USA
Yuri Engelhardt	University of Amsterdam, The Netherlands
Jacques Fleuriot	University of Edinburgh, UK
Jean Flower	Autodesk, UK
David Gooding	Bath University, UK
Corin Gurr	University of Reading, UK
Mary Hegarty	University of California, Santa Barbara, USA
Mateja Jamnik	Cambridge University, UK
Yasuhiro Katagiri	Future University, Japan
Hans Kestler	University of Ulm, Germany
Zenon Kulpa	Institute of Fundamental Technological Research, Poland
Oliver Lemon	University of Edinburgh, UK
Stefano Levialdi	University of Rome – "La Sapienza", Italy
Richard Lowe	Curtin University of Technology, Australia
Grant Malcolm	University of Liverpool, UK
Kim Marriott	Monash University, Australia
Bernd Meyer	Monash University, Australia
Nathaniel Miller	University of Northern Colorado, USA
N. Hari Narayanan	Auburn University, USA
James Noble	Victoria University of Wellington, New Zealand
Jesse Norman	University College London, UK
Jon Oberlander	University of Edinburgh, UK
Luis Pineda	Universidad Nacional Autónoma de México, Mexico City
Helen Purchase	Glasgow University, UK
Thomas Rist	Fachhochschule Augsburg, Germany
Peter Rodgers	University of Kent, UK
Frank Ruskey	University of Victoria, Canada
Atsushi Shimojima	Doshisha University, Japan
Sun-Joo Shin	Yale University, USA
John Sowa	VivoMind Intelligence Inc., USA
Keith Stenning	University of Edinburgh, UK
Nik Swoboda	Universidad Politécnica de Madrid, Spain
Gabi Taentzer	Technical University of Berlin, Germany
Susan Trickett	Naval Research Laboratory, USA
Barbara Tversky	Stanford University and Columbia University, USA

Additional Referees

Bonny Banerjee
Richard Bosworth
Andrew Fish
Unmesh Kurup

Laura Meikle
Matthew Ridsdale
Andrew Seniuk
John Taylor
Sean Wilson
Graham Winstanley
Michael Wybrow
Nissa Yestness

Table of Contents

Keynote Reflections

Heterogeneous Reasoning 1
John Etchemendy

Rich Data Representation: Sophisticated Visual Techniques for Ease and Clarity 2
W. Bradford Paley

Model Driven Development with Mechatronic UML 4
Wilhelm Schäfer

Tutorials

Cognitive Dimensions of Notations: Understanding the Ergonomics of Diagram Use 5
Alan F. Blackwell

Getting Started with Sketch Tools: A Tutorial on Sketch Recognition Tools 9
Beryl Plimmer and Tracy Hammond

Diagram Aesthetics and Layout

General Euler Diagram Generation 13
Peter Rodgers, Leishi Zhang, and Andrew Fish

Euler Diagram Decomposition 28
Andrew Fish and Jean Flower

Smooth Linear Approximation of Non-overlap Constraints 45
Graeme Gange, Kim Marriott, and Peter J. Stuckey

Extremes Are Better: Investigating Mental Map Preservation in Dynamic Graphs 60
Helen C. Purchase and Amanjit Samra

Psychological and Cognitive Issues

An Eye-Tracking Study of Exploitations of Spatial Constraints in Diagrammatic Reasoning 74
Atsushi Shimojima and Yasuhiro Katagiri

What Diagrams Reveal about Representations in Linear Reasoning, and How They Help 89
Krista E. DeLeeuw and Mary Hegarty

What Can Pictorial Representations Reveal about the Cognitive Characteristics of Autism? 103
Maithilee Kunda and Ashok Goel

Visual Thinking with an Interactive Diagram 118
Colin Ware, Anne T. Gilman, and Robert J. Bobrow

Applications of Diagrams

Strategy Roadmaps: New Forms, New Practices 127
Alan F. Blackwell, Rob Phaal, Martin Eppler, and Nathan Crilly

VAST Improvements to Diagrammatic Scheduling Using Representational Epistemic Interface Design 141
David Ranson and Peter C.-H. Cheng

Enhancing State-Space Tree Diagrams for Collaborative Problem Solving 156
Steven L. Tanimoto

Visual Programming with Interaction Nets 165
Abubakar Hassan, Ian Mackie, and Jorge Sousa Pinto

Theoretical Aspects

Spider Diagrams of Order and a Hierarchy of Star-Free Regular Languages 172
Aidan Delaney, John Taylor, and Simon Thompson

Diagrammatic Reasoning System with Euler Circles: Theory and Experiment Design 188
Koji Mineshima, Mitsuhiro Okada, Yuri Sato, and Ryo Takemura

A Normal Form for Euler Diagrams with Shading 206
Andrew Fish, Chris John, and John Taylor

Ensuring Generality in Euclid's Diagrammatic Arguments 222
John Mumma

Depicting Negation in Diagrammatic Logic: Legacy and Prospects 236
Fabien Schang and Amirouche Moktefi

Diagrams in Education

Transforming Descriptions and Diagrams to Sketches in Information System Design 242
Barbara Tversky, James E. Corter, Jeffrey V. Nickerson, Doris Zahner, and Yun Jin Rho

Graphical Revelations: Comparing Students' Translation Errors in Graphics and Logic 257
Richard Cox, Robert Dale, John Etchemendy, and Dave Barker-Plummer

Learning from Animated Diagrams: How Are Mental Models Built? 266
Richard Lowe and Jean-Michel Boucheix

Diagrams for the Masses: Raising Public Awareness – from Neurath to Gapminder and Google Earth 282
Raul Niño Zambrano and Yuri Engelhardt

Understanding and Comprehension

Detection of Sample Differences from Dot Plot Displays 293
Lisa A. Best, Laurence D. Smith, and D. Alan Stubbs

Visualizing Non-subordination and Multidominance in Tree Diagrams: Testing Five Syntax Tree Variants 308
Leonie Bosveld-de Smet and Mark de Vries

The Effects of Users' Background Diagram Knowledge and Task Characteristics upon Information Display Selection 321
Beate Grawemeyer and Richard Cox

Multimodal Comprehension of Graphics with Textual Annotations: The Role of Graphical Means Relating Annotations and Graph Lines . . . 335
Cengiz Acarturk, Christopher Habel, and Kursat Cagiltay

Posters

Talk to the Hand: An Agenda for Further Research on Tactile Graphics 344
Frances Aldrich

Openproof - A Flexible Framework for Heterogeneous Reasoning 347
Dave Barker-Plummer, John Etchemendy, Albert Liu, Michael Murray, and Nik Swoboda

Cognitive and Semantic Perspectives of Token Representation in Diagrams 350
Rossano Barone and Peter C.-H. Cheng

Estimating Effort for Trend Messages in Grouped Bar Charts 353
Richard Burns, Stephanie Elzer, and Sandra Carberry

Types and Programs from Euler Diagrams 357
James Burton

Diagrams in the UK National School Curriculum 360
Grecia Garcia Garcia and Richard Cox

LePUS3: An Object-Oriented Design Description Language 364
Epameinondas Gasparis, Jonathan Nicholson, and Amnon H. Eden

Utilizing Feature Diagrams to Assess the Capabilities of Tools That Support the Model Driven Architecture 368
Benjamin Gorry

Diagrammatic Knowledge-Based Tools for Complex Multi-dynamic Processes 371
Ronald R. Grau and Peter C.-H. Cheng

Supporting Reasoning and Problem-Solving in Mathematical Generalisation with Dependency Graphs 374
Sergio Gutiérrez, Darren Pearce, Eirini Geraniou, and Manolis Mavrikis

A Concept Mapping Tool for Nursing Education 378
Norio Ishii and Saori Sakuma

Cognitive Methods for Visualizing Space, Time, and Agents 382
Angela M. Kessell and Barbara Tversky

Benefits of Constrained Interactivity in Using a Three-Dimensional Diagram 385
Peter Khooshabeh, Mary Hegarty, Madeleine Keehner, and Cheryl Cohen

A Strategy for Drawing a Conceptual Neighborhood Diagram Schematically 388
Yohei Kurata

Supporting Relational Processing in Complex Animated Diagrams 391
Richard Lowe and Jean-Michel Boucheix

Animated Cladograms: Interpreting Evolution from Diagrams 395
Camillia Matuk

Automatic Diagram Drawing Based on Natural Language Text Understanding 398
Anirban Mukherjee and Utpal Garain

Texts and Graphs Elaboration: The Effect of Graphs' Examination on Recall 401
Gisella Paoletti and Sara Rigutti

Diagrammatic Logic of Existential Graphs: A Case Study of Commands 404
Ahti-Veikko Pietarinen

Diagrammatic Reasoning in Separation Logic 408
M. Ridsdale, M. Jamnik, N. Benton, and J. Berdine

Method of Minimal Representation: An Alternative Diagrammatic Technique to Test the Validity of Categorical Syllogisms 412
Sumanta Sarathi Sharma

The Relationship between Graph Comprehension and Spatial Imagery: Support for an Integrative Theory of Graph Cognition 415
Brandie M. Stewart, Aren C. Hunter, and Lisa A. Best

Using MusicXML to Evaluate Accuracy of OMR Systems 419
Mariusz Szwoch

Aestheticization of Flowcharts 423
Wioleta Szwoch

Towards Diagrammatic Patterns 427
Merete Skjelten Tveit

Visualizing Meaning: Literacy Materials for Dyslexic Children 430
Myra Thiessen

Diagrammatic Interrelationships between Global and Local Algebraic Visual Objects: Communicating the Visual Abstraction 433
Julie Tolmie

School Curriculum Development to Promote Student Spontaneous Diagram Use in Problem Solving 437
Yuri Uesaka and Emmanuel Manalo

Author Index 441

Heterogeneous Reasoning

John Etchemendy

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Rich Data Representation: Sophisticated Visual Techniques for Ease and Clarity

W. Bradford Paley

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Model Driven Development with Mechatronic UML

Wilhelm Schäfer

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Cognitive Dimensions of Notations: Understanding the Ergonomics of Diagram Use

Alan F. Blackwell

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Getting Started with Sketch Tools: A Tutorial on Sketch Recognition Tools

Beryl Plimmer and Tracy Hammond

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

General Euler Diagram Generation

Peter Rodgers, Leishi Zhang, and Andrew Fish

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Euler Diagram Decomposition

Andrew Fish and Jean Flower

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Smooth Linear Approximation of Non-overlap Constraints

Graeme Gange, Kim Marriott, and Peter J. Stuckey

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Extremes Are Better: Investigating Mental Map Preservation in Dynamic Graphs

Helen C. Purchase and Amanjit Samra

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

An Eye-Tracking Study of Exploitations of Spatial Constraints in Diagrammatic Reasoning

Atsushi Shimojima and Yasuhiro Katagiri

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

What Diagrams Reveal about Representations in Linear Reasoning, and How They Help

Krista E. DeLeeuw and Mary Hegarty

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

What Can Pictorial Representations Reveal about the Cognitive Characteristics of Autism?

Maithilee Kunda and Ashok Goel

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Visual Thinking with an Interactive Diagram

Colin Ware, Anne T. Gilman, and Robert J. Bobrow

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Strategy Roadmaps: New Forms, New Practices

Alan F. Blackwell, Rob Phaal, Martin Eppler, and Nathan Crilly

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

VAST Improvements to Diagrammatic Scheduling Using Representational Epistemic Interface Design

David Ranson and Peter C.-H. Cheng

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Enhancing State-Space Tree Diagrams for Collaborative Problem Solving

Steven L. Tanimoto

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Visual Programming with Interaction Nets

Abubakar Hassan, Ian Mackie, and Jorge Sousa Pinto

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Spider Diagrams of Order and a Hierarchy of Star-Free Regular Languages

Aidan Delaney, John Taylor, and Simon Thompson

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Diagrammatic Reasoning System with Euler Circles: Theory and Experiment Design

Koji Mineshima, Mitsuhiro Okada, Yuri Sato, and Ryo Takemura

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

A Normal Form for Euler Diagrams with Shading

Andrew Fish, Chris John, and John Taylor

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Ensuring Generality in Euclid's Diagrammatic Arguments

John Mumma

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Depicting Negation in Diagrammatic Logic: Legacy and Prospects

Fabien Schang and Amirouche Moktefi

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Transforming Descriptions and Diagrams to Sketches in Information System Design

Barbara Tversky, James E. Corter, Jeffrey V. Nickerson, Doris Zahner, and Yun Jin Rho

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Graphical Revelations: Comparing Students' Translation Errors in Graphics and Logic

Richard Cox, Robert Dale, John Etchemendy, and
Dave Barker-Plummer

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Learning from Animated Diagrams: How Are Mental Models Built?

Richard Lowe and Jean-Michel Boucheix

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Diagrams for the Masses: Raising Public Awareness – from Neurath to Gapminder and Google Earth

Raul Niño Zambrano and Yuri Engelhardt

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Detection of Sample Differences from Dot Plot Displays

Lisa A. Best, Laurence D. Smith, and D. Alan Stubbs

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Visualizing Non-subordination and Multidominance in Tree Diagrams: Testing Five Syntax Tree Variants

Leonie Bosveld-de Smet and Mark de Vries

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

The Effects of Users' Background Diagram Knowledge and Task Characteristics upon Information Display Selection

Beate Grawemeyer and Richard Cox

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Multimodal Comprehension of Graphics with Textual Annotations: The Role of Graphical Means Relating Annotations and Graph Lines

Cengiz Acarturk, Christopher Habel, and Kursat Cagiltay

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Talk to the Hand: An Agenda for Further Research on Tactile Graphics

Frances Aldrich

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Openproof - A Flexible Framework for Heterogeneous Reasoning

Dave Barker-Plummer, John Etchemendy, Albert Liu, Michael Murray, and Nik Swoboda

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Cognitive and Semantic Perspectives of Token Representation in Diagrams

Rossano Barone and Peter C.-H. Cheng

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Estimating Effort for Trend Messages in Grouped Bar Charts

Richard Burns, Stephanie Elzer, and Sandra Carberry

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Types and Programs from Euler Diagrams

James Burton

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Diagrams in the UK National School Curriculum

Grecia Garcia Garcia and Richard Cox

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

LePUS3: An Object-Oriented Design Description Language

Epameinondas Gasparis, Jonathan Nicholson, and Amnon H. Eden

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Utilizing Feature Diagrams to Assess the Capabilities of Tools That Support the Model Driven Architecture

Benjamin Gorry

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Diagrammatic Knowledge-Based Tools for Complex Multi-dynamic Processes

Ronald R. Grau and Peter C.-H. Cheng

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Supporting Reasoning and Problem-Solving in Mathematical Generalisation with Dependency Graphs

Sergio Gutiérrez, Darren Pearce, Eirini Geraniou, and Manolis Mavrikis

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

A Concept Mapping Tool for Nursing Education

Norio Ishii and Saori Sakuma

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Cognitive Methods for Visualizing Space, Time, and Agents

Angela M. Kessell and Barbara Tversky

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Benefits of Constrained Interactivity in Using a Three-Dimensional Diagram

Peter Khooshabeh, Mary Hegarty, Madeleine Keehner, and Cheryl Cohen

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

A Strategy for Drawing a Conceptual Neighborhood Diagram Schematically

Yohei Kurata

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Supporting Relational Processing in Complex Animated Diagrams

Richard Lowe and Jean-Michel Boucheix

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Animated Cladograms: Interpreting Evolution from Diagrams

Camillia Matuk

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Automatic Diagram Drawing Based on Natural Language Text Understanding

Anirban Mukherjee and Utpal Garain

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Texts and Graphs Elaboration: The Effect of Graphs' Examination on Recall

Gisella Paoletti and Sara Rigutti

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Diagrammatic Logic of Existential Graphs: A Case Study of Commands

Ahti-Veikko Pietarinen

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Diagrammatic Reasoning in Separation Logic

M. Ridsdale, M. Jamnik, N. Benton, and J. Berdine

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Method of Minimal Representation: An Alternative Diagrammatic Technique to Test the Validity of Categorical Syllogisms

Sumanta Sarathi Sharma

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

The Relationship between Graph Comprehension and Spatial Imagery: Support for an Integrative Theory of Graph Cognition

Brandie M. Stewart, Aren C. Hunter, and Lisa A. Best

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Using MusicXML to Evaluate Accuracy of OMR Systems

Mariusz Szwoch

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Aestheticization of Flowcharts

Wioleta Szwoch

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Towards Diagrammatic Patterns

Merete Skjelten Tveit

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Visualizing Meaning: Literacy Materials for Dyslexic Children

Myra Thiessen

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Diagrammatic Interrelationships between Global and Local Algebraic Visual Objects: Communicating the Visual Abstraction

Julie Tolmie

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

School Curriculum Development to Promote Student Spontaneous Diagram Use in Problem Solving

Yuri Uesaka and Emmanuel Manalo

No Institute Given

M. Nickles, M. Rovatsos, and G. Weiss (Eds.): AUTONOMY 2003, LNAI 2969, pp. XI–??, 2004.
© Springer-Verlag Berlin Heidelberg 2004

Author Index

Acarturk, Cengiz 335
Aldrich, Frances 344

Barker-Plummer, Dave 257, 347
Barone, Rossano 350
Benton, N. 408
Berdine, J. 408
Best, Lisa A. 293, 415
Blackwell, Alan F. 5, 127
Bobrow, Robert J. 118
Bosveld-de Smet, Leonie 308
Boucheix, Jean-Michel 266, 391
Burns, Richard 353
Burton, James 357

Cagiltay, Kursat 335
Carberry, Sandra 353
Cheng, Peter C.-H. 141, 350, 371
Cohen, Cheryl 385
Corter, James E. 242
Cox, Richard 257, 321, 360
Crilly, Nathan 127

Dale, Robert 257
Delaney, Aidan 172
DeLeeuw, Krista E. 89
de Vries, Mark 308

Eden, Amnon H. 364
Elzer, Stephanie 353
Engelhardt, Yuri 282
Eppler, Martin 127
Etchemendy, John 1, 257, 347

Fish, Andrew 13, 28, 206
Flower, Jean 28

Gange, Graeme 45
Garain, Utpal 398
Garcia Garcia, Grecia 360
Gasparis, Epameinondas 364
Geraniou, Eirini 374
Gilman, Anne T. 118
Goel, Ashok 103
Gorry, Benjamin 368
Grau, Ronald R. 371
Grawemeyer, Beate 321
Gutiérrez, Sergio 374

Habel, Christopher 335
Hammond, Tracy 9
Hassan, Abubakar 165
Hegarty, Mary 89, 385
Hunter, Aren C. 415

Ishii, Norio 378

Jamnik, M. 408
John, Chris 206

Katagiri, Yasuhiro 74
Keehner, Madeleine 385
Kessell, Angela M. 382
Khooshabeh, Peter 385
Kunda, Maithilee 103
Kurata, Yohei 388

Liu, Albert 347
Lowe, Richard 266, 391

Mackie, Ian 165
Manalo, Emmanuel 437
Marriott, Kim 45
Matuk, Camillia 395
Mavrikis, Manolis 374
Mineshima, Koji 188
Moktefi, Amirouche 236
Mukherjee, Anirban 398
Mumma, John 222
Murray, Michael 347

Nicholson, Jonathan 364
Nickerson, Jeffrey V. 242
Niño Zambrano, Raul 282

Okada, Mitsuhiro 188

Paley, W. Bradford 2
Paoletti, Gisella 401
Pearce, Darren 374
Phaal, Rob 127

Pietarinen, Ahti-Veikko 404
Plimmer, Beryl 9
Purchase, Helen C. 60

Ranson, David 141
Rho, Yun Jin 242
Ridsdale, M. 408
Rigutti, Sara 401
Rodgers, Peter 13

Sakuma, Saori 378
Samra, Amanjit 60
Sato, Yuri 188
Schäfer, Wilhelm 4
Schang, Fabien 236
Sharma, Sumanta Sarathi 412
Shimojima, Atsushi 74
Smith, Laurence D. 293
Sousa Pinto, Jorge 165
Stewart, Brandie M. 415
Stubbs, D. Alan 293
Stuckey, Peter J. 45
Swoboda, Nik 347
Szwoch, Mariusz 419
Szwoch, Wioleta 423

Takemura, Ryo 188
Tanimoto, Steven L. 156
Taylor, John 172, 206
Thiessen, Myra 430
Thompson, Simon 172
Tolmie, Julie 433
Tveit, Merete Skjelten 427
Tversky, Barbara 242, 382

Uesaka, Yuri 437

Ware, Colin 118

Zahner, Doris 242
Zhang, Leishi 13