

## **Programme**

# **The 1<sup>st</sup> Mathematical Cognition and Learning Society Conference**

8-9 of April 2018, Examination schools, Oxford (UK).

Organisers: Roi Cohen Kadosh and Francesco Sella.

[mcls.organiser@gmail.com](mailto:mcls.organiser@gmail.com)

Conference committee members:

Bert De Smedt

Martin Fischer

Jo-Anne LeFevre

Robert Reeve

Xinlin Zhou

# MCLS

MATHEMATICAL COGNITION  
AND LEARNING SOCIETY

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 Oxford University Event Venues



**Symposia/Parallel sessions:** South school, East school, Room 6 and Room 7.

**Poster session/Refreshments:** North school.

**Speakers' room:** Room 10.

**Luggage deposit:** Room 8.

**Registration desk:** Great hall.



# Sunday 8<sup>th</sup> of April 2018

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Time: 8:00 – 8:30

Room: Great hall

## Registration

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Time: 8:30 – 10:00

Room: South School

### Symposium: **Math and Spatial Anxiety: Correlates and Consequences across Development**

Organiser: Coleen Ganley  
*Florida State University*

***Talk 1: Affective Correlates of Math and Spatial Performance During Elementary School: Gender Differences and Predictive Specificity***

Jillian E. Lauer; Alena G. Esposito; Patricia J. Bauer

***Talk 2: Age Differences in Children's Attitudes to Mathematics and Mathematics Anxiety***

Ann Dowker; Olivia Cheriton; Rachel Horton

***Talk 3: Examining Potential Bidirectional Relations between Math Anxiety and Performance in Elementary School***

Colleen M. Ganley; Amanda L. McGraw; Connie Barroso; Elyssa A. Geer

***Talk 4: Reciprocal Relations Among Motivational Frameworks, Math Anxiety, and Math Achievement in Early Elementary School***

Elizabeth A. Gunderson; Daeun Park; Erin A. Maloney; Sian L. Beilock; Susan C. Levine

***Talk 5: Math Anxiety in U.S. Adults: Prevalence and Correlates***

Sara A. Hart; Colleen M. Ganley

***Talk 6: Spatial Anxiety Scale – A Novel Tool with Applications for STEM Education***

Ian M. Lyons; Richard J. Daker; H. Moriah Sokolowski; Zachary Hawes; Gerardo Ramirez; Erin A. Maloney; Danielle N. Rendina; Susan C. Levine; Sian L. Beilock

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Time: 8:30 – 10:00

Room: East School

Parallel session: **Numerical processing 1**

***Talk 1: Role of domain-general processes in numerosity estimation : A life-span study of congruency effects and their sequential modulations in dot comparison tasks.***

Patrick Lemaire; Angélique Roquet; Celine Poletti

***Talk 2: The Evolutionary Role of Continuous Magnitudes in Magnitude-Related Decisions***

Tali Leibovich-Raveh; Shai Gabay

***Talk 3: Simulating the approximate number system with deep learning: Role of continuous visual cues and emergent encoding of numerosity***

Alberto Testolin; Marco Zorzi

***Talk 4: Non-numerical cues are (roughly) irrelevant to determining the content of our numerical thoughts***

Justin Halberda

***Talk 5: Understanding prices: Electrophysiological evidence of fully compositional analysis***

Fernando Ojedo; Pedro Macizo

***Talk 6: Finger dexterity of the pointing hand is linked to dot counting abilities.***

Catherine Thevenot; Nolwenn Guedin

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Time: 8:30 – 10:00

Room: Room 6

Parallel session: **Maths achievements 1**

***Talk 1: Identifying children with persistent low math achievement throughout elementary school years***

Terry Tin-Yau Wong; Winnie Wai-Lan Chan; Gary Kam-Chun Tam

***Talk 2: Persistent mathematics learning difficulties from childhood to adolescence in very preterm children***

Sarah Clayton; Lucy Cragg; Camilla Gilmore; Neil Marlow; Victoria Simms; Rebecca Spong; Samantha Johnson

***Talk 3: Complexity and plasticity of number processing in a case of developmental dyscalculia***

Vitor Haase; Maria Raquel S. Carvalho; Borges Júlia; Isabella Starling-Alves; Giulia Moreira-Paiva

**Talk 4: Relative left handedness more frequent in spelling but not in math learning difficulties: A pilot study**

Maria Raquel Carvalho; Mariuche Rodrigues de Almeida Gomides; Filipe Santos; Giulia Moreira Paiva; Vitor G. Haase

**Talk 5: Impaired neural processing of transitive relations in children with Math Learning Disability**

Flora Schwartz, Justine Epinat-Duclos; Jessica Léone; Jérôme Prado

**Talk 6: How Do We Compare Stimulus Magnitudes? Evidence from an Artificial Algebra**

Randolph Grace; Anna Wilson; Simon Kemp

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Time: 10:00 – 10:30

Room: North school

**Coffee/Tea break**

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Time: 10:30 – 12:00

Room: South school

**Featured Symposium: Is there (really) an evolved capacity for number?**

Organiser: Rafael Núñez  
*University of California, San Diego*

**Talk 1: The number sense and its evolutionary and developmental foundations**

Elizabeth Brannon

**Talk 2: Do infants really have a sense of number? - a meta-analytic approach**

Daniel Ansari

**Talk 3: Selective developmental deficits and its implications for the evolution of numerical abilities**

Brian Butterworth

**Talk 4: Counting systems as cultural tools**

Andrea Bender

**Talk 5: Origin and refinement of number sense in deep neural networks**

Marco Zorzi

**Talk 6: Quantical or numerical? Disentangling biological enculturation from biological evolution**

Rafael Núñez

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Time: 12:00 – 14:00

Room: North school

### **Lunch**

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Time: 12:30 – 13:15

Room: South school

#### **A lunch with the President:**

a discussion about MCLS with Prof. Mark Ashcraft, the MCLS president.

Take your lunch and join the meeting.

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Time: 12:00 – 14:00

Room: North school

### **Poster session 1**

#### **1. The processing of prices across symbolic formats**

Fernando Ojedo; María Mercedes Sánchez-Fortis; Pedro Macizo

#### **2. Overcoming language barriers in early mathematics instruction with “MaGrid” - a language-neutral training tool for multilingual school settings**

Véronique Cornu; Tahereh Pazouki; Christine Schiltz; Antoine Fischbach; Romain Martin

#### **3. The contribution of long term memory and working memory to the mental representation of magnitudes and letters**

Yafit Oscar

#### **4. A longitudinal study on finger counting strategies in 6-years old children**

Dupont Justine; Thevenot Catherine

#### **5. The relation between the understanding of different arithmetic principles and math achievement**

Kam Tai Kwan; Terry Tin-Yau Wong

#### **6. Finger numeral representations contribute to acquiring number semantic**

Rosario Sánchez; Laura Matilla; Josetxu Orrantia; David Muñoz

#### **7. The role of spatial numerical associations in a short-term memory task involving digits**

Jeanne Bagnoud; Pamela Banta Lavenex; Jasinta Dewi; Catherine Thevenot

#### **8. Statistical learning of number pairs: an ERP study**

Ferenc Kemény; Sabrina Finke; Anna Steiner; Corinna Perchtold; Karin Landerl

**9. The relationship between Mathematics Anxiety and Working Memory measures in mathematical and non-mathematical situations.**

Ruggero De Agostini; Silke M. Göbel

**10. Preschool Math Skills Impact Future Achievement**

Pamela Davis-Kean; Thurston Domina; Megan Kuhfeld; Alexa Ellis; Elizabeth Gershoff

**11. Investigating White Matter Pathways in Children's Arithmetic through Spherical Deconvolution**

Brecht Polspoel; Maaïke Vandermosten; Bert De Smedt

**12. Do General Ordinal Relationships Account for Symbolic Number Representation in the Brain?**

Celia Goffin; Stephan Vogel; Daniel Ansari

**13. Can we count on order when performing arithmetic and when performing mathematics?**

Helene Vos; Bert Reynvoet; Wim Gevers; Iro Xenidou-Dervou

**14. A reliability generalization study on Test of Early Mathematics Ability across studies**

Peera Wongupparaj

**15. Larger SNARC amplitude in high math-anxiety individuals: an evidence of worse spatial skills?**

Àngels Colomé; M. Isabel Núñez-Peña

**16. The role of the serial order short-term memory neural network in calculation abilities in children.**

Lucie Attout; Steve Majerus

**17. Eye Fixations and Number Line Estimation: The effect of an external benchmark on whole number estimation using eye-tracking**

Kelsey Mackay; Lieven Verschaffel; Filip Germeys; Koen Luwel

**18. The Influence of Different Size Dimensions on Mental Rotation**

Lisa Beckmann; Naama Katzin; Ronit Goldman; Avishai Henik

**19. Dyscalculic present distance effect in the mental clock task**

Yarden Glikzman; Avishai Henik

**20. State- und Trait-Model of Math Anxiety**

Lars Orbach; Moritz Herzog; Annemarie Fritz

**21. Numerical magnitude extraction process improved in children using mental abacus: evidence from ERP study**

Yuan Yao; Feiyan Chen

**22. The Open Calculation Based on Numbers (ABN) method for learning mathematics as an alternative to the Closed Calculation Based on Ciphers (CBC)**

Carmen M. Canto; Manuel Aguilar; José I. Navarro

**23. Training early numerical skills: Preliminary evidence on preschoolers**

Cristina Semeraro; Rosalinda Cassibba; Daniela Lucangeli

**24. Bidirectional estimation on the number line in kindergarteners in Chile: effect of familiarity with numbers**

Christian Peake; Cristina Rodríguez; Felipe Sepúlveda

**25. The different developmental tendencies of gender differences in number semantic and spatial processing**

Wei Wei; Tingyan Zhang; Chen Chen

**26. A Longitudinal Investigation of the Relations Between Spatial Skills and Math Performance in Elementary School Children**

Elyssa Geer; Jamie Quinn; Colleen Ganley

**27. The Effects of Online Math Fact Training**

Marshal Rodrigues; Darcy Hallett

**28. Relations between Numerical, Spatial, and Executive Function Skills and Mathematics Achievement: A Latent-Variable Approach**

Zack Hawes; Joan Moss; Beverly Caswell; Jisoo Seo; Daniel Ansari

**29. Generating non-symbolic stimuli: An extent to Piazza's (2004) method to control for non-numerical visual cues**

Mathieu Guillaume; Christine Schiltz; Amandine Van Rinsveld

**30. More than number sense: Associations between cognitive control, metacognition and arithmetic in primary school**

Elien Bellon; Wim Fias; Bert De Smedt

**31. Directional magnitude ordering as a marker of understanding counting principles in preschoolers**

Maciej Haman; Katarzyna Lipowska

**32. Patterns, Mathematics, Art and Human Relationships: Assessments and Interventions to Facilitate Progress in a Young Person on the Autism Spectrum**

Christine Lawson

**33. When 7 is closer to 9 than to 8: an expanded measure of implicit number conception**

Rachel Jansen; Ruthe Foushee; Tom Griffiths

**34. The Impact of Stereotype Threat on Mathematical Performance: The case of aging.**

Poshita Nicolas; Patrick Lemaire; Isabelle Régner



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Time: 14:00 – 15:30

Room: South school

**Symposium: *Preschool Foundations of Emerging Mathematics: Building interdisciplinary bridges across children’s cognition, the preschool and the home educational environment.***

Organiser: Gaia Scerif  
*University of Oxford*

***Talk 1: How should we study individual differences in preschoolers’ numerical abilities?***

Ann Dowker; Gaia Scerif

***Talk 2: Learning verbal number words relates to how children attend to numerical quantity***

Moriah Sokolowski; Rebecca Merkley; Sarah Samantha Kingissepp Bray; Praja Vaikuntharajan; Daniel Ansari.

***Talk 3: Preschool children’s understanding of number***

Camilla Gilmore; Sophie Batchelor

***Talk 4: The preschool home learning environment and early number skills***

Fiona Simmons; Elena Soto-Calvo; Anne-Marie Adams; Hannah Francis; Catherine Willis

***Talk 5: Having the confidence to count: reported practitioner maths confidence and the use of “maths-talk” with pre-schoolers***

Emma Dove; Anne Mills; Megan von Spreckelsen; Daniel Ansari; Ann Dowker; Rebecca Merkley; Victoria Murphy; Gaia Scerif; the Preschool Maths Foundation team

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Time: 14:00 – 15:30

Room: East school

**Symposium: *Number words and Arabic digits: development and cross-linguistic differences***

Organiser: Silke M. Göbel  
*University of York*

***Talk 1: Symbolic Processing Mediates the Relationship between Nonsymbolic Processing and Later Arithmetic Performance***

Karin Landerl; Sabrina Finke; Harald Freudenthaler

***Talk 2: Semantic digit-number word mappings, independent from the ANS***

Bert Reynvoet; Mila Marinova; Delphine Sasanguie

***Talk3: Number writing and its concurrent relationship with arithmetic in year 1 children: does number word inversion matter?***

Francina Clayton; Anna Steiner; Karin Landerl; Silke M. Göbel

**Talk 4: Number word inversion influences mental arithmetic in English-speaking adults**  
Julia Bahnmüller; Maier, C. A.; Silke M. Göbel; Korbinian Moeller

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Time: 14:00 – 15:30

Room: Room 6

Parallel session: **Arithmetic and beyond 1**

**Talk 1: Sampling Incidental Mental Arithmetic in Everyday Life with the Aid of Mobile Phones**  
Oliver Lindemann; Martin H. Fischer

**Talk 2: Simple fractions may not be represented componentially: A rejoinder to Bonato et al (2007)**

Darcy Hallett; Jillian D. Adams; Kyle R. Morrissey

**Talk 3: Division as rational numbers: Is there an easier way to introduce fractions?**

Arava Kallai

**Talk 4: The semantic networks are involved in mathematical processing**

Xinlin Zhou

**Talk 5: Interactions of Space and Arithmetic: Operational Momentum in Preschool Children**

Koleen McCrink; Viola Macchi Cassia; Hermann Bulf; Maria Dolores de Hevia

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Time: 15:30 – 16:00

Room: North school

**Coffee/Tea break**

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Time: 16:00 – 17:30

Room: South school

Symposium: **Spontaneous focusing on numerical aspects and the development of mathematical skills**

Organiser: Cristina Nanu

*University of Turku*

**Talk 1: Development of numerical estimation: the role of spontaneous orientation towards different dimensions of magnitude.**

Arnaud Viarouge; Olivier Houdé; Grégoire Borst

**Talk 2: Attention to Number: Specificity and Malleability**

Michèle Mazzocco; Jenny Chan; Taylor Praus-Singh; Sarah Lukowski

**Talk 3: The effect of school starting age on children's spontaneous focusing on numerosity and mathematical skills**

Sophie Batchelor; Joke Torbeyns; Victoria Simms; Cristina Nanu; Eero Laakkonen; Bert De Smedt; Minna Hannula-Sormunen

**Talk 4: A person-centered approach on the effects of formal mathematics education on spontaneous focusing on numerosity and basic arithmetical skill profiles**

Cristina Nanu; Eero Laakkonen; Sophie Batchelor; Joke Torbeyns; Victoria Simms; Bert De Smedt; Minna Hannula-Sormunen

**Talk 5: Spontaneous focusing on Arabic number symbols and its association with numerical abilities and math performance**

Sanne Rathé; Joke Torbeyns; Bert De Smedt; Lieven Verschaffel

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Time: 16:00 – 17:30

Room: East school

**Symposium: Mathematics anxiety: Going a few steps further**

Organiser: Kinga Morsanyi  
*Queen's University*

**Talk 1: Math anxiety interferes with math learning in 6-year-old children**

Carlo Tomasetto; Patrick O'Connor; Veronica Guardabassi; Kinga Morsanyi

**Talk 2: Math anxiety assessment in early elementary school students**

Caterina Primi; Maria Anna Donati; Viola Izzo; Kinga Morsanyi

**Talk 3: Questionnaire math anxiety measurement one step further - norms and online testing; insights from Poland and Germany**

Krzysztof Cipora; Christina Artemenko; Klaus Willmes; Hans-Christoph Nuerk

**Talk 4: Trait and state maths anxiety, cortisol level and maths performance: Exploring the links**

Kinga Morsanyi; Judith Wylie; Zoltan Molnar; Caterina Primi

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Time: 16:00 – 17:30

Room: Room 6

**Parallel session: Maths achievements 2**

**Talk 1: Multiple Skills Underlie Arithmetic Performance: A Large-Scale Structural Equation Modeling Analysis**

Sarit Ashkenazi; Sarit Silverman

**Talk 2: Children's contextual sensitivity predicts concurrent mathematics skill**

Sarah Lukowski; Michele Mazzocco

**Talk 3: Are we barking up the wrong tree? The relation between inhibitory abilities and mathematical achievement**

Kerry Lee

**Talk 4: Kindergarten Predictors of Mathematics: Quantitative, Working Memory and Linguistic Skills**

Marcie Penner-Wilger; Rylan Waring

**Talk 5: The development of number line estimation strategies**

Koen Luwel; Dominique Peeters; Lieven Verschaffel

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Time: 16:00 – 17:30

Room: Room 7

**Parallel session: Arithmetic and beyond 2**

**Talk 1: Sequence Patterning Explains Individual Differences in Children's Calculation**

Kelsey Mackay; Bert De Smedt

**Talk 2: Development of proportional reasoning: The role of congruity and salience**

Reuven Babai; Ruth Stavv

**Talk 3: “Knowing how” versus “knowing that”: the relative contribution of conceptual and procedural knowledge to overall fraction and algebra performance.**

Felix Ayesu; Darcy Hallett; Cherryll Fitzpatrick

**Talk 4: Testing a game-based learning intervention to improve arithmetic via number knowledge**

Tim Jay; Jake Habgood; Martyn Mees

**Talk 5: The effects of teaching mental calculation in the development of mathematical abilities**

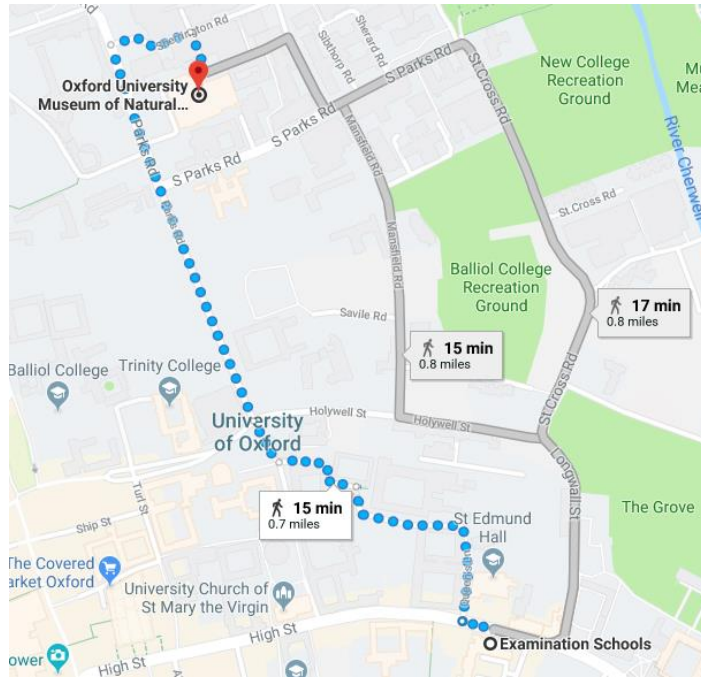
Carola Ruiz

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Time: 18:00 – 19:30

Location: Museum of Natural History

**Drinks reception**



## Monday 9<sup>th</sup> of April 2018

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Time: 8:30 – 10:00

Room: South school

### Symposium: **Arithmetic and Reading: Related Building Blocks**

Organiser: Lien Peters<sup>1</sup>; Kiran Vanbinst<sup>2</sup>

*University of Western Ontario<sup>1</sup>; University of Leuven<sup>2</sup>*

**Talk 1: Individual differences in (cognitive) precursors of arithmetic and reading in 5-year olds**

Kiran Vanbinst; Elsje van Bergen; Pol Ghesquière; Bert De Smedt

**Talk 2: Pattern understanding as a predictor of early growth in reading and arithmetic skills**

Kelly Burgoyne; Stephanie Malone; Charles Hulme

**Talk 3: Early childhood general knowledge: A domain-general mechanism for long-term achievement in arithmetic and reading**

Tanya M. Evans; David W. Grissmer

**Talk 4: Differences in cognitive profiles of children with MD, RD or MDRD**

Jonna Salminen; Tuire Koponen; Kenneth Eklund; Riikka Heikkilä; Mikko Aro

**Talk 5: Dyscalculia and dyslexia: Different behavioral, yet similar neural profiles**

Lien Peters; Jessica Bulthé; Nicky Daniels; Hans Op de Beeck; Bert De Smedt

**Talk 6: Neural bases of comorbidity of dyscalculia and dyslexia in adults**

Anna Wilson; David Moreau; Reece Roberts; Karen Waldie

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Time: 8:30 – 10:00

Room: East school

### Parallel session: **Numerical processing 2**

**Talk 1: When a million is more than infinity: The influence of the decimal structure on perceiving numbers as "large"**

Michal Pinhas; Rut Zaks-Ohayon

**Talk 2: The role of the left intraparietal sulcus (IPS) in tactile enumeration – Behavioral and neuroanatomical findings**

Zahira Ziva Cohen; Isabel Arend; Kenneth Yuen; Sharon Naparstek; Yarden Gliksman; Ronel Veksler; Avishai Henik

**Talk 3: Meta-analysis study of fMRI activation in the interference effects of Numerical Stroop Task**

Patricia Freitas; Guilherme Wood

**Talk 4: Symbolic estrangement or symbolic integration of numerals with quantities: Methodological pitfalls and a possible solution**

Mila Marinova; Delphine Sasanguie; Bert Reynvoet

**Talk 5: Spatial order relates to the exact numerical magnitude of digits in young children**

Francesco Sella; Daniela Lucangeli; Roi Cohen Kadosh; Marco Zorzi

**Talk 6: Roman Numerical Cognition**

Sophie Batchelor; Matthew Inglis

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Time: 8:30 – 10:00

Room: Room 6

Parallel session: **Education**

**Talk 1: Worked-out solutions to unstructured problems: A tool to support social metacognitive regulation?**

Sheila Evans

**Talk 2: Bridging intuitive and analytical thinking in mathematics education**

Uri Leron; Lissner Rye Ejersbo

**Talk 3: Visuospatial working memory in mathematical performance using Open Calculation Based on Numbers Algorithm (ABN)**

Estibaliz Aragon; Manuel Aguilar; Carmen M. Canto; Carlos Mera; Candida Delgado; Gamal Cerda; Carlos Perez Wilson; José I. Navarro

**Talk 4: Students' Mathematical Practices of Defining: A Piagetian Perspective**

Amelia Farid; Ellen Kulinsky

**Talk 5: Home numeracy and children's mathematical outcomes in Chilean preschoolers**

Maria Ines Susperreguy; Jo-Anne Lefevre; Heather Douglas; Chang Xu; Natalia Molina-Rojas

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Time: 10:00 – 10:30

Room: North school

Coffee/Tea break

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Time: 10:30 – 12:00

Room: South school

**Symposium: Accessing rational numbers – Nature and nurture**

Organisers: Edward Hubbard<sup>1</sup>; Jake McMullen<sup>2</sup>; Percival Matthews<sup>1</sup>  
*University of Wisconsin-Madison<sup>1</sup>; University of Turku<sup>2</sup>*

**Talk 1: Non-Symbolic Ratio Reasoning in Children and Adults**

Emily Szkudlarek; Elizabeth M. Brannon

**Talk 2: Similar behavioral effects for nonsymbolic ratio processing and symbolic fractions suggests common mechanisms**

Percival Matthews; Rui Meng; John Binzak; Elizabeth Toomarian; Edward Hubbard

**Talk 3: Number line uni-dimensionality is key to promoting fraction representations**

Elizabeth A. Gunderson

**Talk 4: Do Children Understand Fraction Addition?**

Jing Tian; David Braithwaite; Robert Siegler

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Time: 10:30 – 12:00

Room: East school

**Symposium: Reliability and validity of the SNARC effect**

Organisers: Wim Fias<sup>1</sup>; Jean-Philippe van Dijck<sup>2</sup>  
*Ghent University<sup>1</sup>; Ghent University/Thomas More College<sup>2</sup>*

**Talk 1: The reliability paradox: Why robust cognitive tasks do not produce reliable individual differences**

Craig Hedge; Georgina Powell; Petroc Sumner

**Talk 2: Who has (a consistent) SNARC: investigating prevalence of the SNARC effect by means of estimating confidence intervals - psychometric and resampling approaches.**

Krzysztof Cipora

**Talk 3: About the validity of the SNARC effect: The importance of working memory**

Jean-Philippe van Dijck; Wim Fias

**Talk 4: Flexible behavioral and neural modulations of the SNARC effects: Implications for construct validity**

Philipp Alexander Schroeder; Hans-Christoph Nuerk; Christian Plewnia



***Talk 5: Is the SNARC effect a valid measure of numerical skills? Insights from its relation to mathematical abilities over the lifespan***

Carrie Georges; Danielle Hoffmann; Christine Schiltz

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Time: 10:30 – 12:00

Room: Room 6

Parallel session: **Arithmetic and beyond 3**

***Talk 1: The developmental of estimation skills across the life span***

Dana Ganor-Stern

***Talk 2: Automatization of facts or automatization of procedure? The case of alphabet arithmetic verification.***

Jasinta Dewi; Catherine Thevenot

***Talk3: The Numerical Approximation System's cognitive factors and calculation fluency***

Carlos Mera; Estibaliz Aragon; Manuel Aguilar; Manuel Garcia Sedeño; Gamal Cerda; Carlos Perez Wilson; José I. Navarro

***Talk 4: Struggling with single-digit multiplications: testing several hypotheses***

Juan Antonio Álvarez-Montesinos; Ismael Rodríguez-Montenegro; Marina Cuadra Jaime; Javier García-Orza

***Talk 5: Procedure learning without algorithmic speed up***

Jamie Campbell; Yalin Chen; Alicia Orr

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Time: 12:00 – 14:00

Room: North school

**Lunch**

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Time: 12:30 – 13:15

Room: South school

**A lunch with the Editors:**

Dr John Towse and Dr Barbara Sarnecka to discuss the Journal of Numerical Cognition and preregistered reports

Take your lunch and join the meeting.

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Time: 12:00 – 14:00

Room: North school

## Poster session 2

**1. Same or different? The ERP signatures of uni- and crossmodal integration of number words and Arabic digits**

Sabrina Finke; Ferenc Kemény; Corinna M. Perchtold; Silke M. Göbel; Karin Landerl

**2. Symbolic number processing and individual differences in adult's arithmetic performance**

Laura Matilla; Rosario Sánchez; Josexu Orrantia; David Muñoz

**3. The effects of manipulatives in the instructional interventions of mathematics learning disabilities: a systematic review**

Anne Lafay; Helena Patricia Osana

**4. Improving the use of associativity shortcuts: Interventions using inversion problems**

Joanne Eaves; Nina Attridge; Camilla Gilmore

**5. Neural Underpinnings of Nonsymbolic Numerical Comparison in Adolescents with Different Math Performance**

Roberto A. Abreu-Mendoza; Yaira Chamorro; Daniel Zarabozo-Hurtado; Esmeralda Matute

**6. Interaction Effects between BDNF Gene rs6265 Polymorphism and Parent-Involved Education on Primary School Children Basic Mathematical Ability: The Moderating Effect of Gender**

Ming-Liang Zhang; Jiwei Si; Weixing Yang; Hongxia Li; Jiajia Zhang

**7. The Dissociation between Pupil Dilation and Reaction Time in the Numerical Stroop Task**

Ronen Hershman; Lisa Beckmann; Avishai Henik

**8. ERP analysis of hemispheric asymmetry for arithmetic tasks: A comparison of remembering, understanding, and applying-based tasks.**

Kanok Panthong; Pattrawadee Makmee; Peera Wongupparaj

**9. Nonsymbolic arithmetic with continuous magnitudes: Evidence from an artificial algebra paradigm.**

Anna Wilson; Cam Hooson; Simon Kemp; Randolph Grace

**10. The Wicked Problem of Research in Mathematical Cognition: Elephants in the Room**

Rene Grimes

**11. Associations between number processing and single-digit arithmetic: Effects of age, intelligence, operation mastery and SES?**

Isabella Starling Alves; Mariuche Rodrigues de Almeida Gomides; Luciano da Silva Amorim; Vitor Geraldi Haase

**12. Neural processing of transitive relations predicts math growth in children**

Flora Schwartz; Justine Epinat-Duclos; Jessica Léone; Jérôme Prado

**13. Influences of basic numerical competencies on fraction processing**

Thomas Dresler; Silke M. Bieck; Katharia Lambert; Korbinian Moeller

**14. The educational technology and innovation for children with math disability in Thailand: A systematic review**

Jakkarin Chinsuwan; Piyathip Pradujprom; Parinya Ruengtip; Peera Wongupparaj

**15. Persistent structural differences in developmental dyscalculia: a longitudinal morphometry study**

Ursina McCaskey; Michael von Aster; Ruth O'Gorman Tuura; Karin Kucian

**16. Semantic networks support approximate computation**

Mengyi Li; Yuxin Tan; Xinlin Zhou

**17. The common and differential neural developmental trajectories for approximate number system, arithmetic and word phonology**

Yuxin Tan; Mengyi Li; Xinlin Zhou

**18. Cognitive heterogeneity of math difficulties: a bottom-up classification approach**

Larissa Salvador; Vitor Haase

**19. The depth of numerical processing in Navon's paradigm**

Inna Barkan; Dana Ganor-Stern; Joseph Tzelgov

**20. The role of acquired visual cues in magnitude comparisons**

Nirit Fooks Leichter; Nachshon Korem; Batsheva Hadad; Orly Rubinsten

**21. Who Gains More: Experts or Novices? The Benefits of Interaction under Numerical Uncertainty**

Francesco Sella; Robert Blakey; Dan Bang; Bahador Bahrami; Roi Cohen Kadosh

**22. Dissociation of neuronal communication accompanying symbolic vs. non-symbolic numerical comparisons**

Nachshon Korem; Naama Levin; Orly rubinsten

**23. Language influence on mathematics achievement in French-German biliterate ninth graders**

Sophie Martini; Sonja Ugen

**24. Does Pain Detriment Complex Arithmetic More Than Simple Arithmetic Performance?**

Jayne Pickering; Nina Attridge; Matthew Inglis

**25. Classroom-based executive function assessments predict kindergarten students' math achievement.**

Sammy Ahmed; Frederick Morrison

**26. Mental abacus training promotes number acuity**

Rui Xiao; Jiaxin Cui; Mei Ma; Yan Chen; Li Yuan; Leinian Li; Xinlin Zhou

**27. How and when children master the numerical content conveyed by verbal numbers and number gesture ?**

Line Vossius; Marie-Pascale Noël; Laurence Rousselle

**28. Tactile Enumeration and Embodied Numerosity Among the Deaf**

Shachar Hochman; Zahira Cohen; Avishai Henik

**29. Brain mechanisms related to processing of numerals: A magnetoencephalography (MEG) study**

Victoria Simms; Paul Boyce; Yogesh Meena; Hubert Cecotti; Girijesh Prasad

**30. Effects of Math Anxiety and Math Ability on University Mathematics Engagement**

Richard Daker; Sylvia Gattas; Helen M Sokolowski; Ian Lyons

**31. The relation between the processing of space and ordinal information in working memory: a tDCS-EEG study.**

Sophie Antoine; James G. Sheffield; Wim Gevers; Roi Cohen Kadosh

**32. Dimensional Thinking as Foundation for Teaching Math and Computer Programming**

Julia Shaw; Jianhao Chen; Sen Zhang; Jayleen Wangle

**33. Contributions of inhibitory control to decimal processing and mathematics achievement**

Linsah Coulanges; Sashank Varma; Miriam Rosenberg-Lee

**34. Spatial Reasoning in Middle School Children: Two-dimensional Representations of Three-dimensional Shapes**

İpek Saralar

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Time: 14:00 – 15:30

Room: South school

Symposium: **The development of symbolic fraction knowledge – Processes and proponents**

Organisers: Jake McMullen<sup>1</sup>; Percival Matthews<sup>2</sup>; Edward Hubbard<sup>2</sup>

*University of Turku<sup>1</sup>; University of Wisconsin-Madison<sup>2</sup>*

**Talk 1: The ratio processing system underpins symbolic fraction understanding: Developmental neuroimaging investigations**

Edward M. Hubbard; John V. Binzak; Yunji Park; Priya Kalra; Elizabeth Y. Toomarian

**Talk 2: Evaluating Learning Outcomes of a Game-Based Rational Number Training**

Kristian Kiili; Antti Koskinen; Korbinian Moeller; Manuel Ninaus

**Talk 3: Effects of a number line approach for improving fraction understanding in students with math disabilities**

Nancy C. Jordan; Nancy Dyson; Christina Barbieri; Jessica Rodrigues

**Talk 4: Neurofunctional plasticity in fraction learning assessed by pre-post intervention fMRI**

Silke M. Bieck; Manuel Ninaus; Elise Klein; Kristian Kiili; Johannes Bloechle; Julia Bahnmueller; Thomas Dresler; Korbinian Moeller

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Time: 14:00 – 15:30

Room: East school

**Symposium: Math Anxiety: from psychophysiology to interventions, through genetic and learning**

Organisers: Sara Caviola<sup>1</sup>; Ann Dowker<sup>2</sup>  
*University of Cambridge<sup>1</sup>; University of Oxford<sup>2</sup>*

**Talk 1: The psychophysiology of math anxiety: Evidence from skin conductance measurement**

Orly Rubinsten; Hili Eidlin Levy; Nachshon Korem

**Talk 2: Time pressure and eye-movements: A new physiological measures of math anxiety**

Sara Caviola; Dénes Szűcs

**Talk 3: Acquisition, development and maintenance of maths anxiety in young children**

Dominic Petronzi

**Talk 4: Math anxiety and numeracy training in fourth-grade children**

Maria Chiara Passolunghi; Sandra Pellizzoni

**Talk 5: Development of math anxiety and its longitudinal relationships with arithmetic achievement among primary school children.**

Riikka Sorvo; Tuire Koponen; Helena Viholainen; Tuija Aro; Eija Räikkönen; Pilvi Peura; Asko Tolvanen; Mikko Aro

**Talk 6: Genetic, Environmental and Neural underpinnings of Mathematical Anxiety**

Yulia Kovas; Tomasz Bloniewski

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Time: 14:00 – 15:30

Room: Room 6

**Parallel session: Numerical processing 3**

**Talk 1: Analog Magnitude representations are precise contents with epistemic limitations**

Justin Halberda

**Talk 2: The Time Course of Central Executive Loads Affect Adults' Strategy Execution in Arithmetic with Different Level of Approximate Number System Acuity**

Hongxia Li; Mingliang Zhang; Shuang Cui; Jiwei Si

**Talk 3: Executive functions and the mapping between nonsymbolic and symbolic mathematics.**

Ilse Coolen; Julie Castronovo; Kevin Riggs; Myfanwy Bugler

**Talk 4: Developmental Trajectory Of Numerical Acuity In Pakistan**

Saeeda Khanum; Tayyaba Abid

**Talk 5: The Relationship Between Symbolic and Non-Symbolic Number Processing Inside and Outside of the Subitizing Range**

Jane Hutchison; Ian Lyons

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Time: 15:30 – 16:00

Room: North school

Coffee/Tea break

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Time: 16:00 – 17:30

Room: South school

**Symposium: Foundations for fractions – Non-symbolic ratio processes and relational reasoning**

Organisers: Percival Matthews<sup>1</sup>; Edward Hubbard<sup>1</sup>; Jake McMullen<sup>2</sup>  
*University of Wisconsin-Madison<sup>1</sup>; University of Turku<sup>2</sup>*

**Talk 1: Spontaneous Abstraction of Ratios and Ranks Across Magnitude Dimensions**

Cory D. Bonn; Jessica F. Cantlon

**Talk 2: Is the Non-Symbolic Ratio Processing System Automatic in Adults?**

Nina Attridge; Jayne Pickering; Joanne Eaves; Grace Huyton; Matthew Inglis; Camilla Gilmore; Iro Xenidou-Dervou

**Talk 3: Precise Encoding of Relations and Spontaneous Focusing on Multiplicative Relations Support Fraction Magnitude Knowledge**

Jake McMullen; Robert Siegler

**Talk 4: Reasoning About Fraction Magnitudes and Proportions When Curriculum Supports a Measurement Model of Fraction Understanding: An Australian Sample**

Ilyse Resnick; Micah Goldwater; Nora Newcombe

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Time: 16:00 – 17:30

Room: East school

**Symposium: Unpacking the Role of Numerical Ordinal Processing in the Development of Early Math Abilities**

Organisers: Chang Xu<sup>1</sup>; Ian Lyons<sup>2</sup>  
*Carleton University<sup>1</sup>; Georgetown University<sup>2</sup>*

***Talk 1: Ordinal numerical processing in 4-year-old preschool children: Associations with other early numerical competencies and gender differences***

Merel Bakker; Joke Torbeyns; Nore Wijns; Lieven Verschaffel; Bert De Smedt

***Talk 2: Kindergarteners reliably mis-classify ordered sequences of non-adjacent numbers***

Ian M. Lyons; Jane E. Hutchison; Stephanie Bugden; Celia Goffin; Daniel Ansari

***Talk 3: Unpacking the relation between comparison and arithmetic in both adults and children***

Delphine Sasanguie; Ian M. Lyons; Bert De Smedt; Bert Reynvoet; Helene Vos

***Talk 4: Integration of number relations for children in grades 1-2***

Chang Xu; Jo-Anne LeFevre

***Talk 5: The role of numerical and non-numerical ordering abilities in mathematics: Evidence from children with dyscalculia and typically developing children***

Kinga Morsanyi; Bianca van Bers; Teresa McCormack; Patrick O'Connor

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Time: 16:00 – 17:30

Room: Room 6

**Parallel session: Maths achievements 3**

***Talk 1: Old brains and their money. Anatomical substrates and neurocognitive predictors of financial abilities in Mild Cognitive Impairment.***

Carlo Semenza; Francesca Burgio; Micaela Mitolo; Giorgio Arcara; Annalena Venneri; Francesca Meneghello; Roberta Toffano; Silvia Benavides-Varela

***Talk 2: Exploring Diagrams Influence on Students' Mental Models of Mathematical Story Problems***

Anna Bartel; Martha Alibali

***Talk 3: Predicting mathematical ability before school: A link between ROBO1, parietal cortex volume and numerical reasoning***

Michael Skeide; Katharina Wehrmann; Angela Friederici

**Talk 4: The Neurochemistry of Mathematical Development**

George Zacharopoulos; Francesco Sella; Roi Cohen Kadosh

**Talk 5: Understanding number line estimation performance in Down Syndrome and Williams Syndrome**

Victoria Simms; Annette Karmiloff-Smith; Jo Van Herwegen

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Time: 16:00 – 17:00

Room: Room 7

Parallel session: **Philosophy**

**Talk 1: Ordinals vs. Cardinals in  $\mathbb{N}$  and Beyond**

Aviv Keren

**Talk 2: Intuition and Higher Mathematical Cognition**

Francesco Beccuti

**Talk 3: Evolution -- the blind mathematician producing increasingly sophisticated users of mathematical discoveries**

Aaron Sloman

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Time: 17:45 – 18:45

Room: South school

**Business meeting** (open to all members)

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