Programme

The 1st 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

Conference committee members:

Bert De Smedt
Martin Fischer
Jo-Anne LeFevre
Robert Reeve
Xinlin Zhou
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 8th of April 2018

**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
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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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

Time: 10:00 – 10:30
Room: North school

Coffee/Tea break

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
Time: 12:00 – 14:00
Room: North school

Lunch

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.

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; Josetxe Orrantia; David Muñez

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
Ruggero De Agostini; Silke M. Göbel

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; Maaike 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

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 Gerveys; 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 Gliksman; 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; Feiyian 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

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
**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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**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

**Talk 3:** 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 Bahnmueller; Maier, C. A.; Silke M. Göbel; Korbinian Moeller  
  
**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  
  
**Time:** 15:30 – 16:00  
**Room:** North school  

Coffee/Tea break  

**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

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

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

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 Stavy

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

Time: 18:00 – 19:30
Location: Museum of Natural History

Drinks reception
Monday 9th of April 2018

Symposium: Arithmetic and Reading: Related Building Blocks
Organiser: Lien Peters1; Kiran Vanbinst2
University of Western Ontario1; University of Leuven2

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

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

Organisers: Edward Hubbard¹; Jake McMullen²; Percival Matthews¹

*University of Wisconsin-Madison¹; University of Turku²*

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

Organisers: Wim Fias¹; Jean-Philippe van Dijck²

*Ghent University¹; Ghent University/Thomas More College²*

**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

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

Talk 3: The Numerical Approximation System’s cognitive factors and calculation fluency
Carlos Mera; Estibaliz Aragon; Manuel Aguilar; Manuel García 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

Time: 12:00 – 14:00
Room: North school

Lunch

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.
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; Josetxu Orrantia; David Múñez

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; Patrawadee Makmee; Peera Wongupparaj

   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 Praduprom; 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

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

Time: 14:00 – 15:30
Room: South school

Symposium: The development of symbolic fraction knowledge – Processes and proponents
Organisers: Jake McMullen¹; Percival Matthews²; Edward Hubbard²

University of Turku¹; University of Wisconsin-Madison²

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; Ann Dowker

1 University of Cambridge  
2 University of Oxford

**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; Tuiru 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

Time: 15:30 – 16:00
Room: North school

Coffee/Tea break

Time: 16:00 – 17:30
Room: South school

Symposium: Foundations for fractions – Non-symbolic ratio processes and relational reasoning
Organisers: Percival Matthews¹; Edward Hubbard¹; Jake McMullen²
University of Wisconsin-Madison¹; University of Turku²

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

Organisers: Chang Xu¹; Ian Lyons²

Carleton University¹; Georgetown University²

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

Parallel session: Maths achievements 3

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)