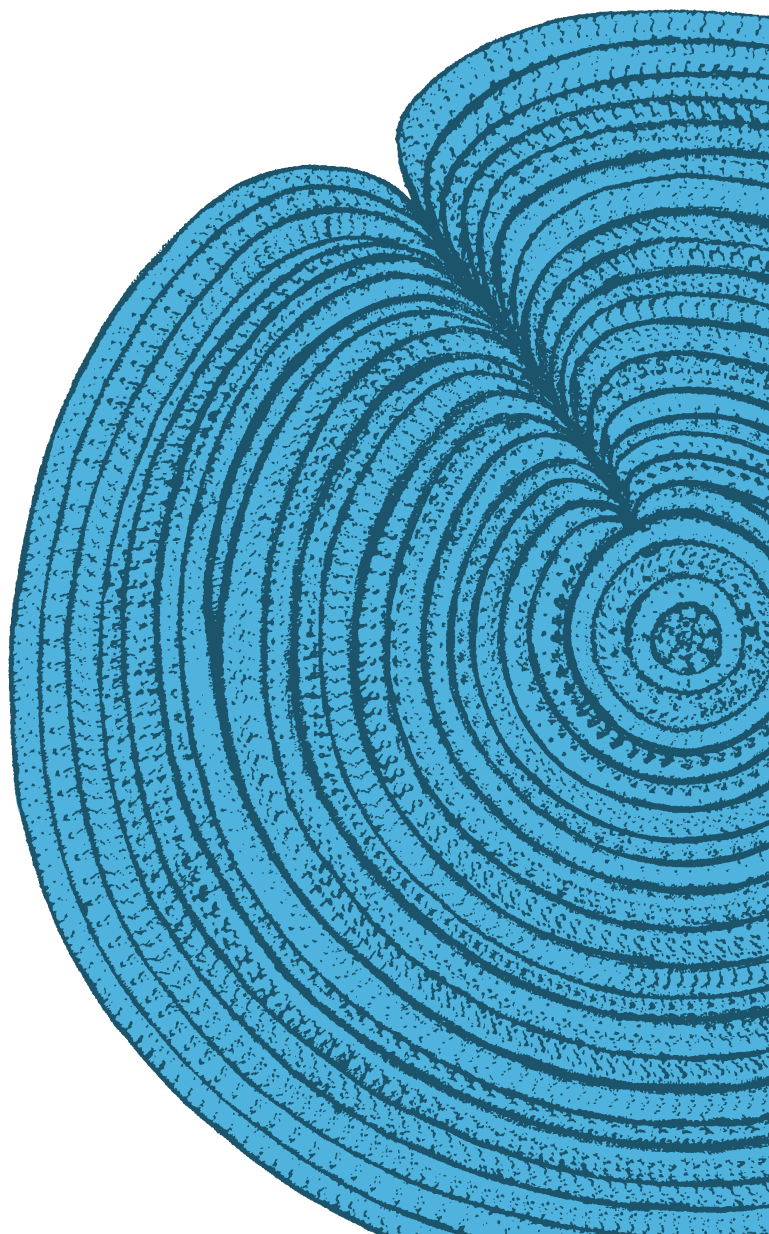




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TSPC2016

Proceedings of the
Trieste Symposium on Perception and Cognition
November 4



edited by
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Preface

This book of proceedings collects the abstracts of talks and posters presented at the *Trieste Symposium on Perception and Cognition* 2016, organized by the Psychology Unit of the Department of Life Sciences, University of Trieste, and held at campus on the 4th of November.

This year TSPC2016 did also include the 24th annual *Kanizsa Lecture*, which has been delivered, as a special event fitting into the long tradition of *Kanizsa Lectures* opened in 1993 by Irvin Rock (see The Kanizsa Lectures list).

The TSPC2016 book of proceedings opens with the abstracts of the 24th Kanizsa Lecture held by the 2016 invited speaker W. Tecumseh Fitch, Department of Cognitive Biology, University of Vienna, Austria.

A second contribution of the TSPC2016 book includes abstracts from the "Roundtable Comparative Perception: A tribute to Professor Mario Zanforlin" (Organizer: Cinzia Chiandetti). The roundtable featured 5 key speakers – Osvaldo Da Pos, Yegor Malashichev, Christian Agrillo, Daniel Osorio, and Meta Virant-Doberlet - in the field of comparative perception and cognition honouring the memory of Professor Mario Zanforlin, who has recently passed away. The invited speakers show that the comparative perspective with which to look at various phenomena that has been Mario's approach will continue to prompt works in the broad fields of perception and cognition. Osvaldo Da Pos, worked on aggressive behaviour and steroid hormones in human and non-human species but later he focused on perception and specifically on colour perception. His main contribution has been the application of the model of transparency to chromatic colours. Within this roundtable, he witnessed the everlasting bond between Padova and Trieste and discussed about the relationship between Stimuli and Context in perception. Yegor Malashichev, works on lateralization and his contribution follows the guidelines of the true European ethological school: observing an organism in its own environment. From

reptiles to whales, from frogs to kangaroos he showed that humans aren't all that unique and claimed about Mother-infant lateral biases in humans and wild animals: conservatism of the phenomenon and its benefits for fitness. Christian Agrillo, after studying biological motion in the chicks, has specialized on numerical representation running experiments with different animal species and recently has started to investigate visual illusion in animals. Christian presented his latest studies in monkeys and fish. Daniel Osorio, studies colour vision and object recognition by observing different animal species from butterflies to primates. He has also investigated symmetry perception in the chick with two influential Mario's students, Lucia Regolin and Giorgio Vallortigara. Daniel is involved in animal welfare and is part of a team writing the guidelines for the use of cephalopods. In his talk, he provides insights on How Cuttlefish see objects. Meta Virant-Doberlet studies vibrational communication in insects. She investigates this intriguing, and unsuspected, signalling trying to respond to all 4 Tinbergen's questions and has presented "A day in a life of a bug linguist".

The third part of the volume collects abstracts of talks and posters presented at regular oral and poster sessions of TSPC2016.

Each abstract published in the proceedings has been evaluated by an anonymous expert reviewer and by the organizers. The list of anonymous reviewers who supported the editorial process is reported in the next section.

About 54 active participants gathered at TSPC2016, coming from Italy and other European countries (Serbia 7, Germany 2, Greece 1, Slovenia 1, Hungary 1). It featured 9 talks and 45 posters. The book of proceedings includes written reports of all talks, and 40 out of 45 posters. Several areas of cognitive science were covered, including: perception (talks 4, 6, 8; posters 4, 5, 17, 24, 27, 29, 36); mindfulness (talk 1); action and perception (talk 6; posters 4, 19, 22, 30, 34); attention (posters 7, 29); memory (talk 3, 7; posters); learning (poster 17); development (posters 14, 23, 25, 31, 33); language (poster 13, 39); problem solving and reasoning (poster 20); personality (posters 11, 18, 25); decision-

making (poster 20); concepts and categorization (talks 2; poster 4, 16, 33, 38, 39); social cognition (talk 4, 5; posters 6, 9, 40); animal cognition (talk 9; posters 1, 3, 8, 15, 36, 37); neuropsychology (poster 2, 10, 12, 22, 26, 28, 35, 38); rehabilitation (posters 22); developmental disorders (posters 2, 5, 10, 12); applied psychology (poster 7, 21, 28, 30, 32, 34); executive processes: monitoring, inhibitory control (posters 7, 14, 18, 23, 35);

In terms of disciplines, contributions included modelling, behavioral experiments with humans and animals, cognitive neuroscience, linguistics, philosophy, and vision.

We thank all authors who submitted an abstract to be included in the proceedings, and the reviewers who supported the editorial process with their fast and constructive reactions.

Finally, for their institutional and financial support to TSPC2016 we thank the Department of Life Sciences and the PhD program in Neural and Cognitive Sciences of the University of Trieste.

Paolo Bernardis
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Approximate Number System (ANS) acuity, mathematical ability and inhibitory control: A longitudinal perspective from First to Second grades

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Keywords: Approximate Number System, mathematical ability, inhibitory control, non-symbolic comparison task, congruent and incongruent trials

Recent research has turned increasing attention to the cognitive underpinnings of early mathematical competence. The Approximate Number System (ANS) is a non-verbal primitive cognitive system that allows to represent and estimate numerical quantity in an imprecise and intuitive way [1]. It is present at birth, is amodal and it supports basic numerical computations like adding, subtracting and comparing quantities without using counting or numerical symbols [2]. ANS acuity is the degree of precision of the internal quantity representation and there are considerable individual differences in ANS precision [3]. Recent findings demonstrating a relationship between ANS acuity and mathematical ability have suggested that the ANS plays a foundational role on later-learned math skills [3]. However, not all studies have found links between the ANS and mathematical ability in children and the evidence for a relationship in adults is mixed [2]. It is still unclear if the relationship between the ANS and mathematical ability found in some studies could be mediated by other general cognitive abilities [1]. Indeed, recent research findings suggest that this relationship may be the result of inhibition skills, rather than the precision of nonsymbolic representations [4].

The primary purpose of this 2-year longitudinal study was to investigate the relationship between the ANS and mathematical ability, analysing the data separately for congruent and incongruent dot comparison task trials. We measured ANS acuity, verbal intelligence and different aspects of numerical and mathematical competence in 110 children twice, in first and second grade (Time 1 and Time 2), a year apart. ANS acuity was assessed with a computerized non-symbolic numerical comparison task.

At Time 1, correlational analyses indicated that ANS acuity was associated with mathematical ability. This association was significant for both congruent and incongruent trials of the dot comparison task. In particular, it was found that the subgroup of children with higher ANS performance showed better mathematical ability than the subgroup of children with lower ANS performance. Also at Time 2, correlational analyses suggested an association between ANS acuity and mathematical ability and this positive correlation was significant for both congruent and incongruent trials again. These results are in contrast with the hypothesis that the relationship between the ANS and mathematical ability may be an artefact of the inhibitory control demands of incongruent trials in the dot comparison task [4]. This study thereby suggests a tight link between the ANS and mathematical ability.

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