

## SCIENCE FOR EDUCATION – AN INTERNATIONAL APPROACH

November 17, 2022

Brazilian Academy of Sciences, Rio de Janeiro, Brazil  
Rua Anfilofio de Carvalho 29 – 3<sup>rd</sup> floor -- Downtown - CEP 20030-12

**9:00-9:20 - Opening remarks – Roberto Lent (Coordinator, Unesco Chair), Marlova Noleto (Director, Unesco Brasil), Denise Pires de Carvalho (Rector, Federal University of Rio de Janeiro), and Fernanda Tovar-Moll (President, D’Or Institute of Research and Education)**

**9:20-9:30 – Primer talk – Stanislas Dehaene (College de France) – New tools for reading education: assessment, diagnosis and intervention.**

**9:30-9:40 (F2F) – Alejandra Carboni (Universidad de la Republica, Uruguay) – Children’s Affective Decision-Making development: The Role of environmental harshness**

Life history theory proposes that growing in harsh environments modulates affective decision-making development. The harshness of the context refers to morbidity and mortality caused by external factors which escape to individual control (for instance, the possibility of death from a stray bullet in the context of a dispute between neighborhood gangs). The aim of this study was to examine the association between affective-decision making in children, socioeconomic status (SES), and local violence (measured as the cumulative homicide rate in the three years before the completion of the cognitive assessment).

We administered the Children’s Gambling Task (CGT) to 224 children between the ages of 5 and 7 years. The analysis showed associations among SES, local violence and affective decision-making.

**9:45-9:55 (F2F) – Alejandro Maiche (Universidad de la Republica, Uruguay) – Learning Math through interactions with peers and with intelligent machines.**

Recent research has found that games using concrete materials, played by groups of children who communicate and cooperate or compete with one another can enhance children’s learning in school settings. In this talk, we will show results from an exploratory study

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comparing the effects of concrete games played by groups and digital-individual games on children's learning of mathematics in the early school years. For children with low performance in math, playing with concrete games by groups enhanced their performance in math more than playing the same game individually with their own tablet. These results suggest that the peer interactions that emerge in group settings have powerful influences on learning, especially for those children at risk of being left behind.

**10:00-10:10 (Virtual) – Ulla Richardson (University of Jyväskylä, Finland)  
– On GraphoLearn – The digital evidence-based method for supporting  
the development of reading skills in all learners**

GraphoLearn method was developed to provide scientifically solid, evidence-based, cost effective and a motivating serious game, to the problem of insufficient reading skills. The need for both an efficient screening/assessment system as well as early reading support from decoding skills to comprehension is urgent for children with learning difficulties due to biological or environmental reasons. I will present an overview of the GL method including the basic principles and research findings from several language versions of GL providing an individually adapting support tool for all learners.

**10:15-10:25 (F2F) – Andrea Goldin (Universidad Torcuato Di Tella and  
CONICET, Argentina) – Essential cognitive abilities for the XXIst Century  
citizen that can be promoted in the classroom**

Executive functions are a set of purposeful goal-directed capabilities that are crucial for everyday behavior in children and adults. In this talk we will bring them into the radar while discussing strategies to promote them during development and at schools.

**10:30-10:40 (F2F) – Cecilia Calero (Universidad Torcuato Di Tella,  
Argentina) – Let's talk about teaching and human behavior.**

The study of teaching, as the fundamental activity driving the transmission of information between humans, has been mostly carried out by the educational sciences. This resulted in a lack of studies that systematically evaluated how this activity takes place in terms of human behavior. In this talk we will discuss the development of teaching skills from an experimental psychology approach, trying to contribute to this vacant area. The idea is to show how through the use of simple experimental paradigms, of which the originality is to put boys and girls in the role of teachers, it is possible to study how humans transmit information and what is the impact of that transmission on our own learning processes.

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**10:45-10:55 (Virtual) – Filip De Fruyt and Gisele Alves (Ayrton Senna Chair at Ghent University, Belgium | Ayrton Senna Institute, EduLab21, Brazil) – Assessing and developing social-emotional skills in public education in Brazil.**

The past decade there has been increasing attention in education and the labor market for the assessment and development of social-emotional skills of students and employees. We will present a taxonomy of these skills and how these can be assessed and monitored in education from a student and public policy perspectives. We will also discuss challenges for this emergent field.

**11:00-11:10 (Virtual) – Grégoire Borst (Université de Paris Descartes, France) – Cognitive and self control as core mechanisms of learning: implications in and out of the classroom.**

Our ability to control our behavior, impulsivity, our habits, our thoughts and emotions are critical abilities for succeeding academically, professionally and more generally in life. We will present a series of studies proving seminal examples of the role of such mechanisms in numeracy and literacy (including media literacy) and some pedagogical interventions in and out of the classroom that proved useful to help students develop such abilities.

**11:15-11:25 (F2F) – Juan Valle Lisboa (Universidad de la Republica, Uruguay) – Learning to read in Spanish is easy, yet many students fail to reach good reading levels in several Spanish speaking countries. Why is that so?**

Learning to read in Spanish is easy yet many children do not reach appropriate reading levels. I will present the results of two studies, a longitudinal study aimed at assessing the predictors of reading ability and a pilot intervention to teach letter knowledge. I will argue that in transparent orthographies like that of Spanish, it is crucial to teach letter sound correspondences and blending at the beginning of reading education.

**11:30-11:40 (F2F) – Marcela Peña (Universidad Catolica de Chile) – Developmental cognitive neuroscience of early learning at formal and informal environments**

Healthy development during preschool age is foundational for later learning abilities at school. We will emphasize the relevance of exploring learning at this age period and propose an Artificial Intelligence approach to integrate the analysis of the data provided by cognitive

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neuroscience and bio-demographic evaluations, with the perspective of inform educators and public policy about the promotion of learning skills before attending the school.

**11:45-11:55 (Virtual) – Nancy Estévez-Perez (Centro de Neurociencias de Cuba) – Cuban studies on numerical cognition: pillars and future directions of a (neuro)science for education.**

The neural, behavioural and cultural foundations of numerical cognition have received closer attention from educators, researchers and policy makers, both internationally and in Cuba, in the last decade. Here, we present the main results of a group of studies and initiatives conducted by the Cuban Neurosciences Center and illustrate key strenghts and future directions to extend them and translate scientific evidence in order to impact learning outcomes and public policy making.

**12:00-12:10 (Virtual) – Janet Werker (University of Columbia, Canada) – Foundations of language acquisition in infancy: implications for later development.**

A brief overview of speech perception and lexical (word learning) development in monolingual and bilingual learning infants, including findings on how infants develop from language-general to language specific listeners, how they use their growing knowledge of the sound system of their native language (or languages) to guide word learning, and how face to face conversations contribute to these developmental achievements. Monolingual and bilingual learning infants will be compared.

**12:15-12:25 (F2F) – Roberto Lent (Federal University of Rio de Janeiro and D'Or Institute, Brazil) – Connectomic reserve: a mechanistic hypothesis for neuroplasticity**

Neuroplasticity is conceived to be the basic property that instruments the brain to respond to changes in the environment, including educational interventions. Among all types of plasticity, the presence of “secret” connections in the brain may guarantee the occurrence of long-distance reorganization of brain circuits that take place after subtle and drastic events originating from the environment. Evidence will be provided to substantiate the hypothesis that a connectomic reserve may be the mechanistic underpinning of neuroplasticity.

**12:30-12:40 (Virtual) – Tracey Tokuhamas-Espinosa (Harvard University Extension School, USA) – What kids want to know about their own brains? 600 questions from around the world**

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It has been suggested that children develop a “theory of brain” between 8- and 9-years old in which they think they know how they learn best. Children then use this theory as a part of their heuristics to judge their abilities in future learning, as do adults. While observation of children and some direct questions were involved in earlier studies, the opportunity for children and teens to formulate their own questions on the brain was not included in these earlier works. As far as we can ascertain, this is the first international study to ask the open-ended question, “What do you want to know about your own brain?” to children and teens 3-18-years old. We will share findings as well as offer insights as to some interesting patterns in student answers, including the similarity of questions from around the world, and how the overall lack of knowledge about the brain leads to misinterpretation of learning potential.

**12:45-12:55 (F2F) – Andrea Chiba (University of California at San Diego, USA) – Understanding neurobiological and physiological states for learning and plasticity**

Our readiness to apprehend information and integrate our dynamics with the world around us relies on the state of our brains and bodies. The ability to regulate those states and optimize them for different types of learning relies on fundamental aspects of our neuroanatomy, our developmental challenges, and the cultural and educational practices that shape us.

**13:00-13:10 (Hybrid) – Closing remarks**

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