Twelfth Family Research Network (FRN) Forum

"Understanding the Early Years in Childhood – A Singapore Perspective"

Tuesday, 15 July 2014
Mochtar Riady Auditorium, Level 5
SMU Administration Building

family research network

MSF

IPS Institute of Policy Studies
Lee Kuan Yew School of Public Policy, National University of Singapore

ECDA Early Childhood Development Agency

TWELFTH FAMILY RESEARCH NETWORK (FRN) FORUM:
"UNDERSTANDING THE EARLY YEARS IN CHILDHOOD – A SINGAPORE PERSPECTIVE"
15 JULY 2014

PRESENTATION III

On the Improvement of Executive Function in Pre-schoolers

Associate Professor Kerry Lee
Programme Head
Educational & Cognitive Development Lab
National Institute of Education
and
Mr Tony Lim
Master's Candidate
Nanyang Technological University

family research network
MSF
IPS Institute of Policy Studies
Lee Kuan Yew School of Public Policy, National University of Singapore
Early Childhood Development Agency

NANYANG TECHNOLOGICAL UNIVERSITY

Little Scientists

Human Developmental Lab

On the Improvement of Executive Function in Pre-schoolers

Li QU[1], Zhao Ming Tony, LIM[1],
Kerry Lee[2], Ringo Moon-Ho Ho[1]

[1]Division of Psychology
[2] National Institute of Education

Nanyang Technological University

12th Family Research Network (FRN) Forum, Singapore, 15th July 2014

Outline

I. Introduction

1. On the development of executive function

II. On the improvement of executive function

1. An intervention program on information updating
2. An intervention program on problem solving

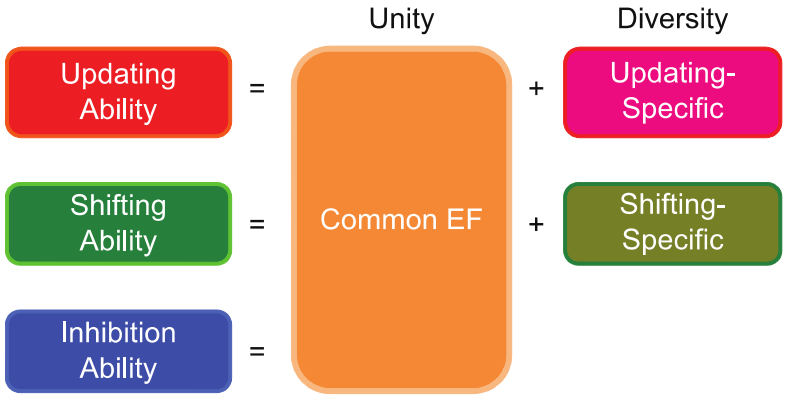
III. Discussion

What are Executive Functions?

Executive functions (EF) refer to the processes required for the goal-directed regulation and conscious control of thought, emotion, and action (e.g., Zelazo, 2012; Zelazo, Qu, & Müller, 2005).

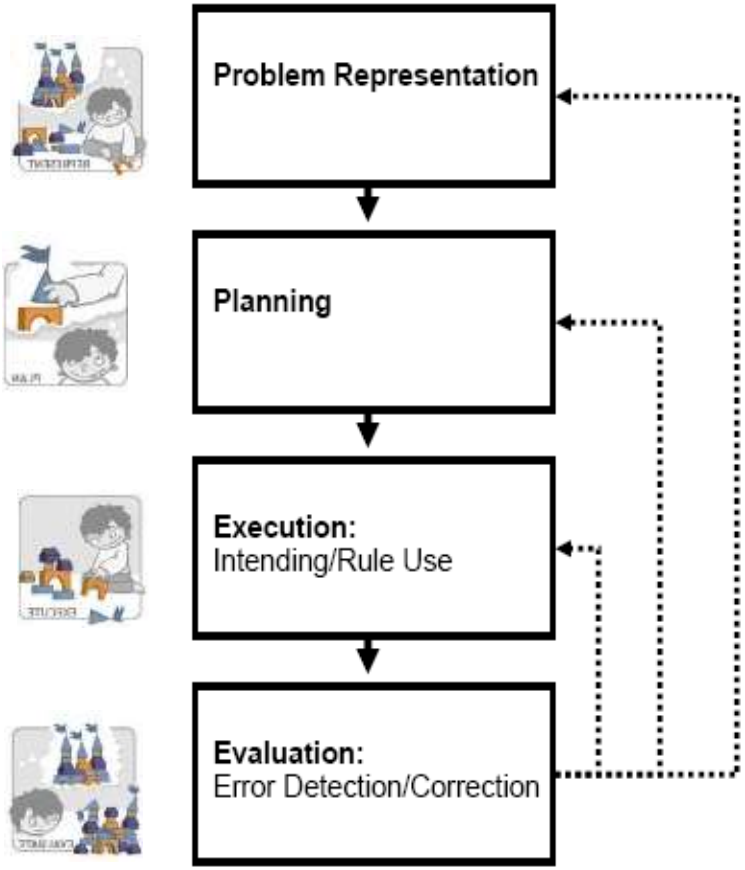
Understanding EF

Component perspective



(Miyake & Friedman, 2012)

Functional perspective

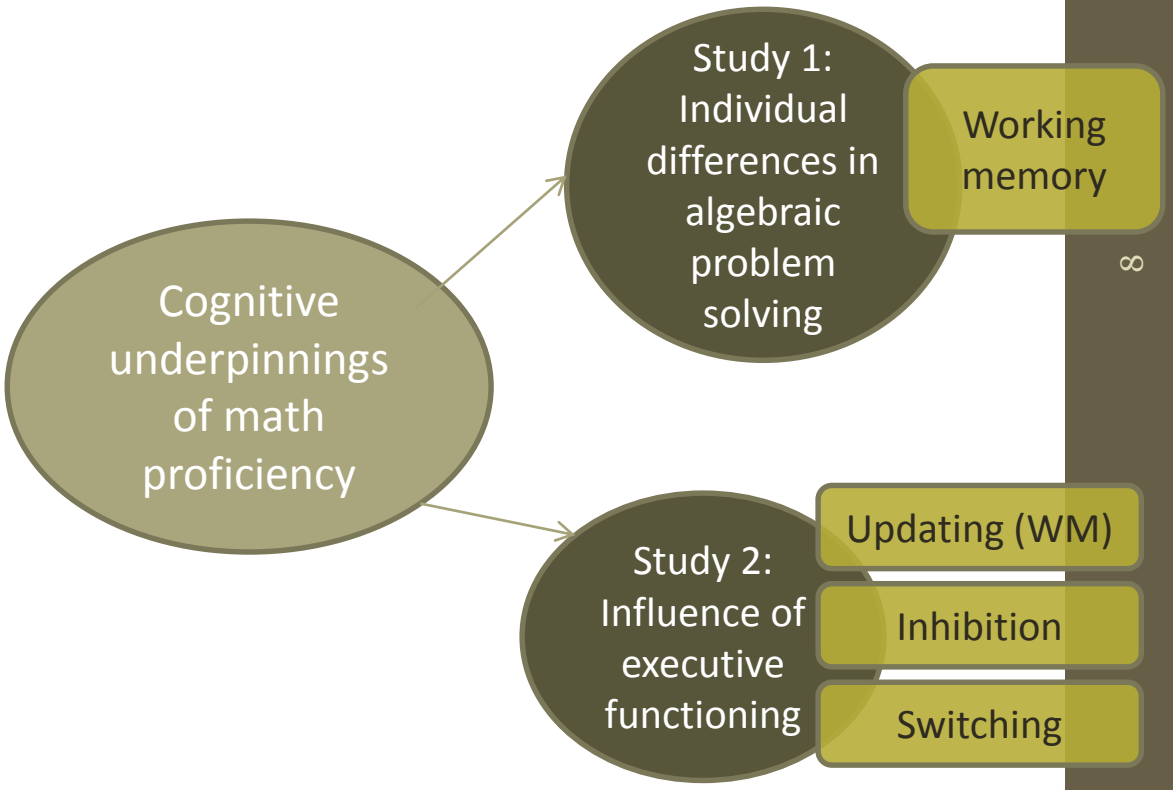


(Zelazo et al., 1997)

Executive Function & Children's Development

- Better executive functioning has been linked to
  - Improved school readiness
  - Better academic performance
  - Reduced behavioural problems
  - Better mental health during later years (e.g., Atkinson et al., 2005; Blair & Razza, 2007; Happe & Frith, 1996; Lee et al., 2009; Hughes & Ensor, 2008).

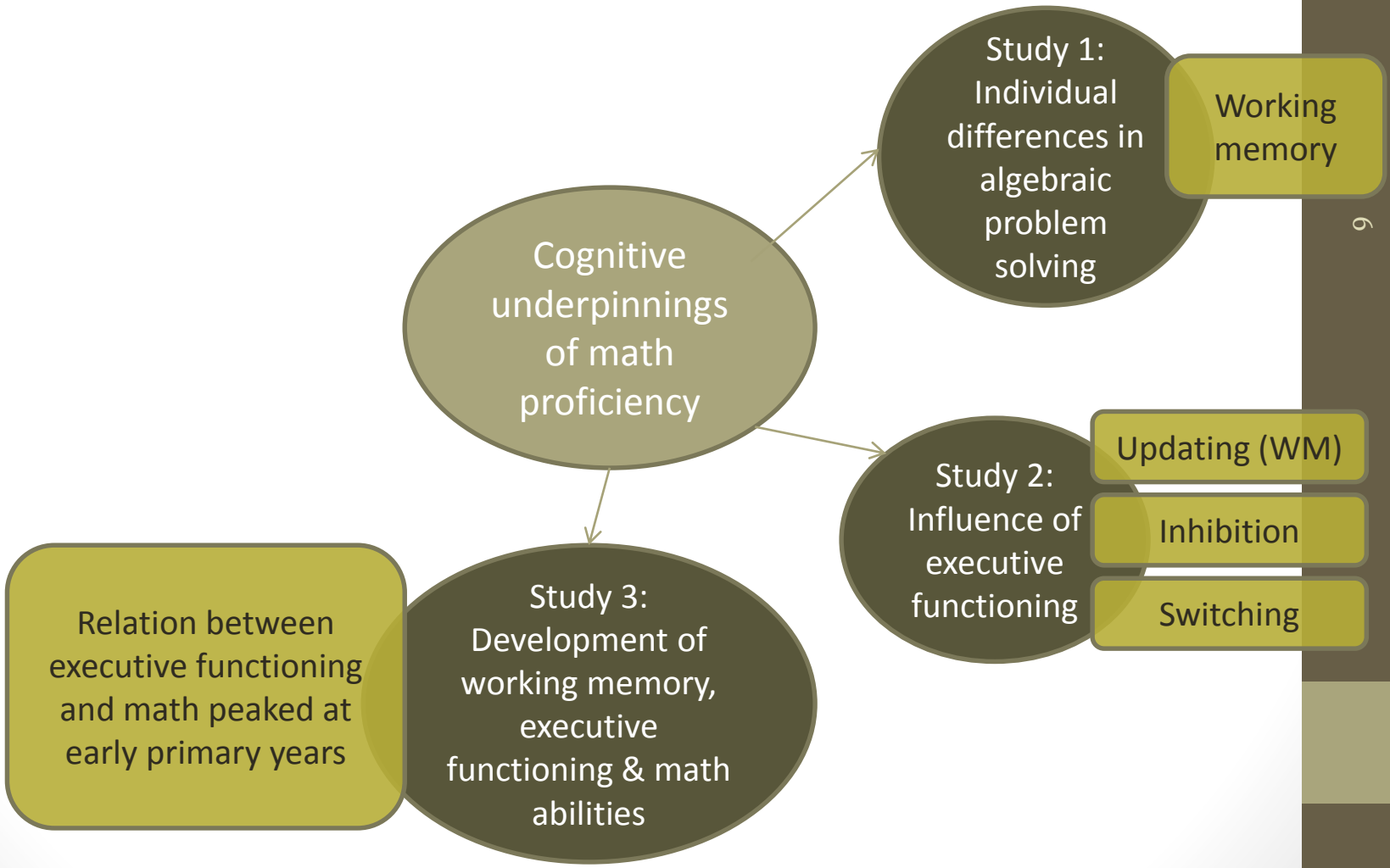
EF & Academic Performance



Lee, Ng, Ng, & Lim (2004) *Jn Exp Child Psych*

Lee, Ng, & Ng (2009) *Jn Educational Psych*

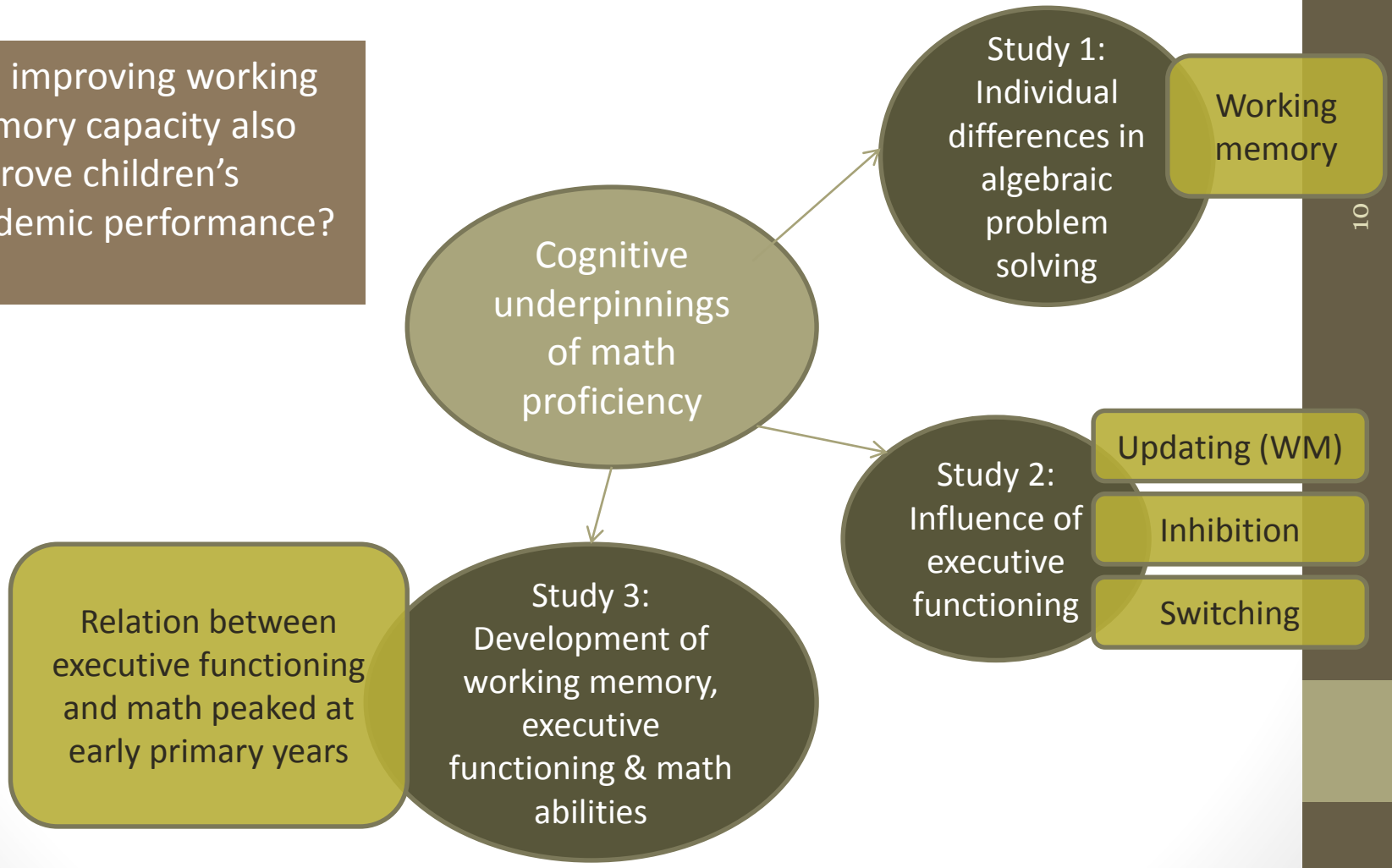
EF & Academic Performance



Lee, Bull, & Ho (2013) *Child Dev.*

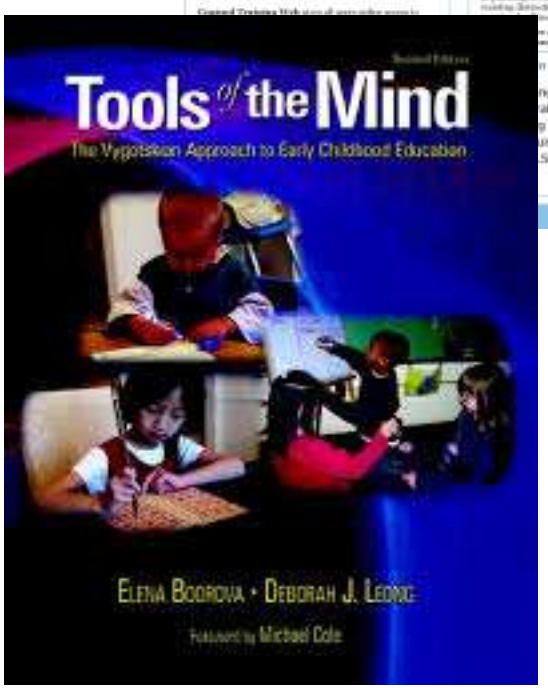
EF & Academic Performance

Will improving working memory capacity also improve children's academic performance?



Improving EF

- Repeated practice of a component of EF such as working memory and attention control may be effective (Klingberg et al., 2002; Rueda et al., 2005).
- Functional approach such as promoting children's self-regulation skills in cognitive, social, and emotional domains may also be useful (Bierman et al., 2008; Riggs et al., 2006).

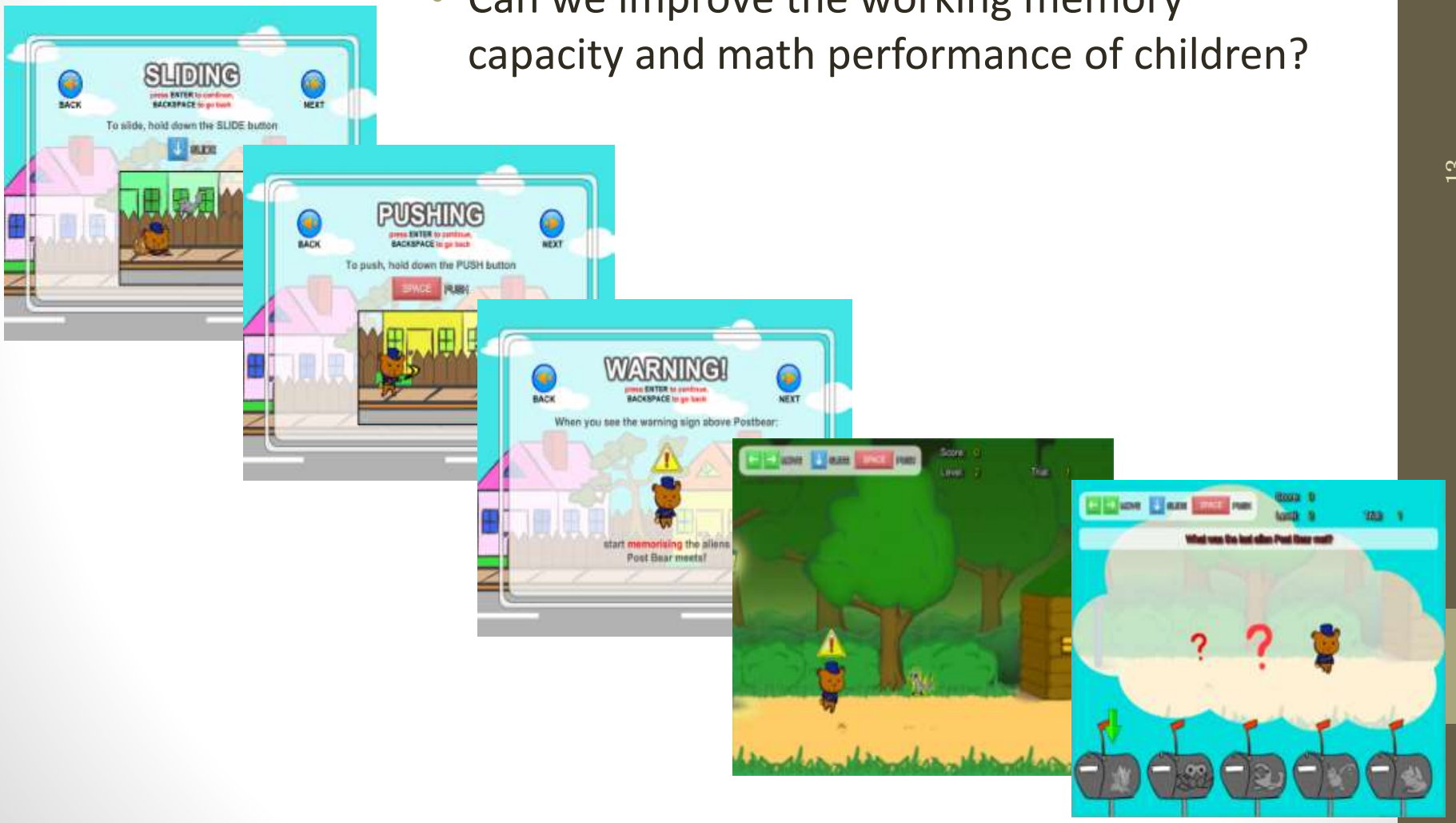


An Example


MOVE
SLIDE
SPACE
PUSH
press ESCAPE to pause
Score: 1000
Level: 1
Trial: 4

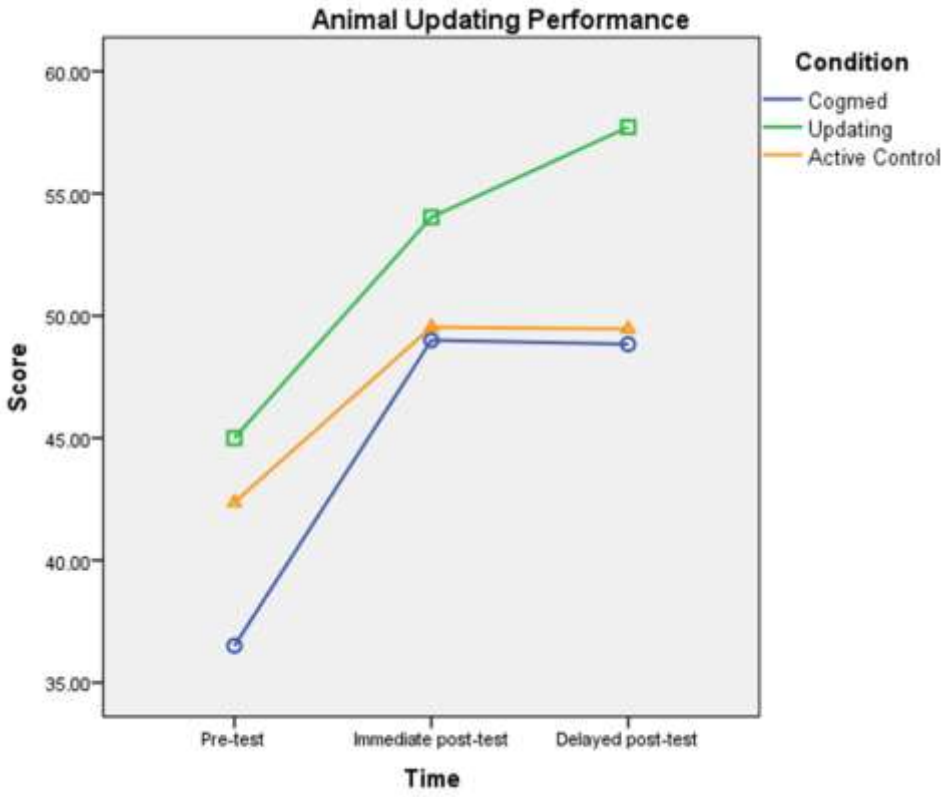
Updating Intervention

- Can we improve the working memory capacity and math performance of children?



Results

- Significant differences between updating intervention and CogMed and active control groups at the long-term post-test



- A problem-solving approach to improve executive function in preschoolers

Tony Lim Zhao Ming
Masters Student
Email: LIMZ0090@ntu.edu.sg
Telephone: (65) 91183929

Acknowledgement

Funding organization

This research project is funded by the Family Research Fund (FRF) of the Ministry of Social and Family Development (MSF), Singapore. The findings and views expressed in this report are that of the authors and do not represent the views of MSF.

- Children
- Parents
- Childcare centers
- Research assistants

PI

Qu Li

Assistant Professor

Email: quli@ntu.edu.sg

Website:

http://portal.hss.ntu.edu.sg/qudevelopmentallab/index.html

Telephone: (65) 6514-1052 Address: HSS 04-04, 14 Nanyang Drive, Singapore 637332

Co-PI

HO Moon-ho Ringo
Associate Professor
Email (add @ntu.edu.sg):
homh
Office Location:
HSS-04-07
Office phone number:
(65) 6316-8944

Head of Psychology Division

Collaborator

Dr. Kerry Lee
Associate Professor
Head, Education & Cognitive Development Lab

Email: Kerry.Lee@nie.edu.sg

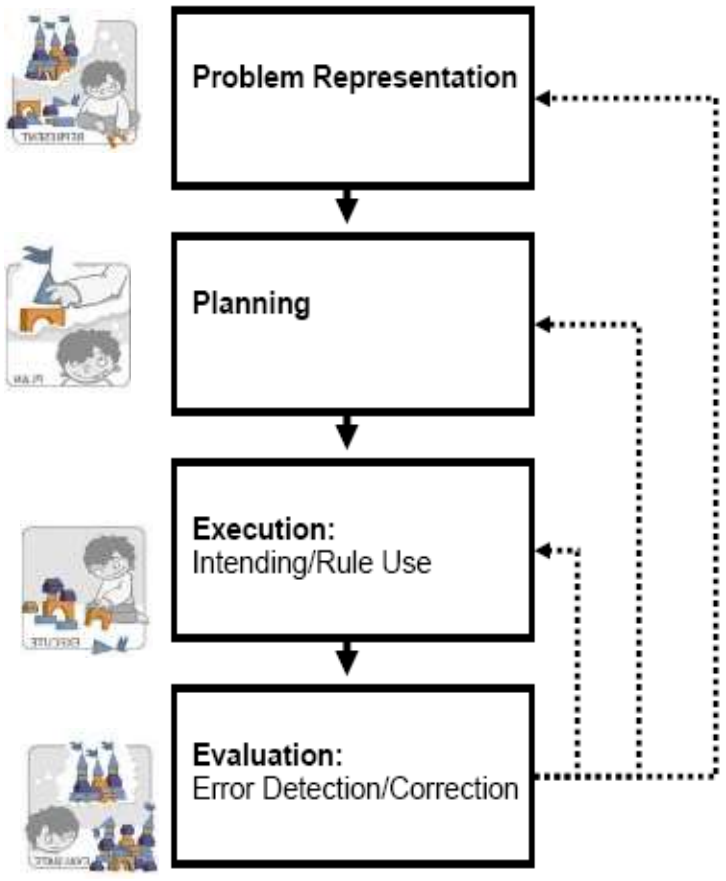
http://www.nie.edu.sg/profile/lee-kerry

A problem-solving approach to improve executive function in preschoolers

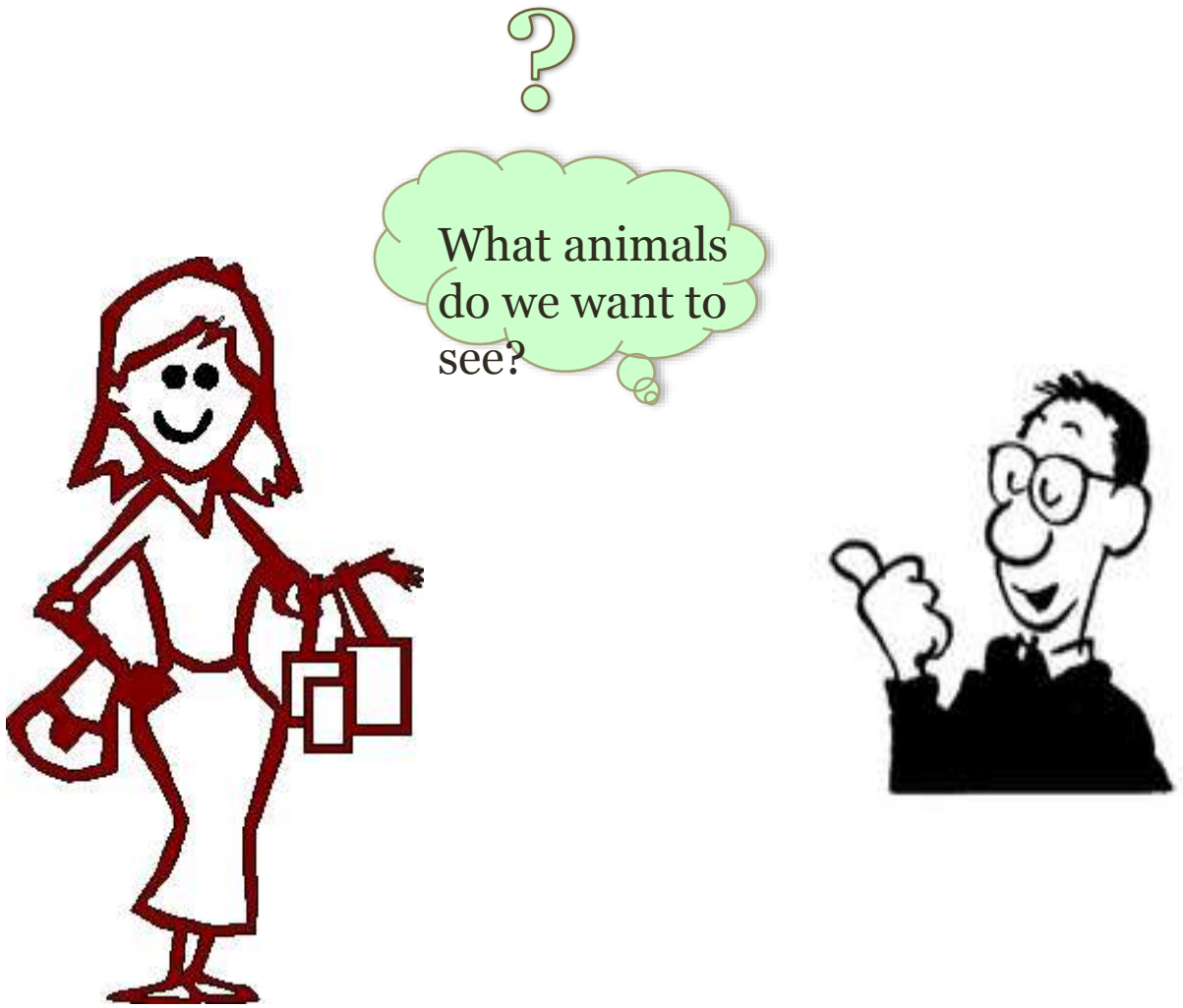
- Group-based
- 10 weekly sessions, an hour a session

Including

1. Working memory
2. Inhibition
3. Cognitive flexibility
4. Problem-solving skill



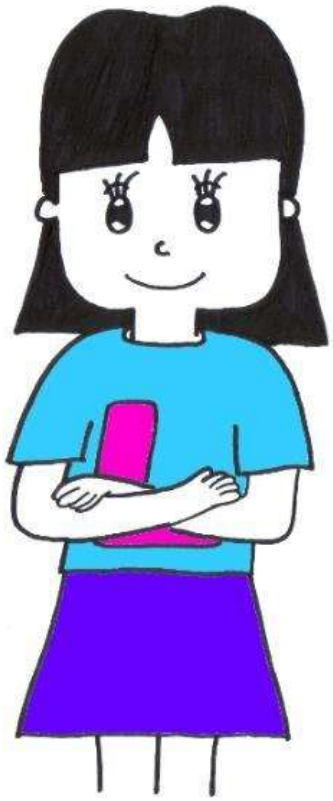
(Zelazo et al., 1997)



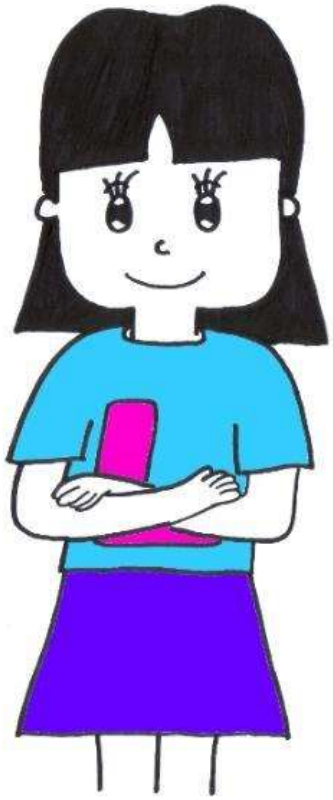
Stage 1: Ask

?

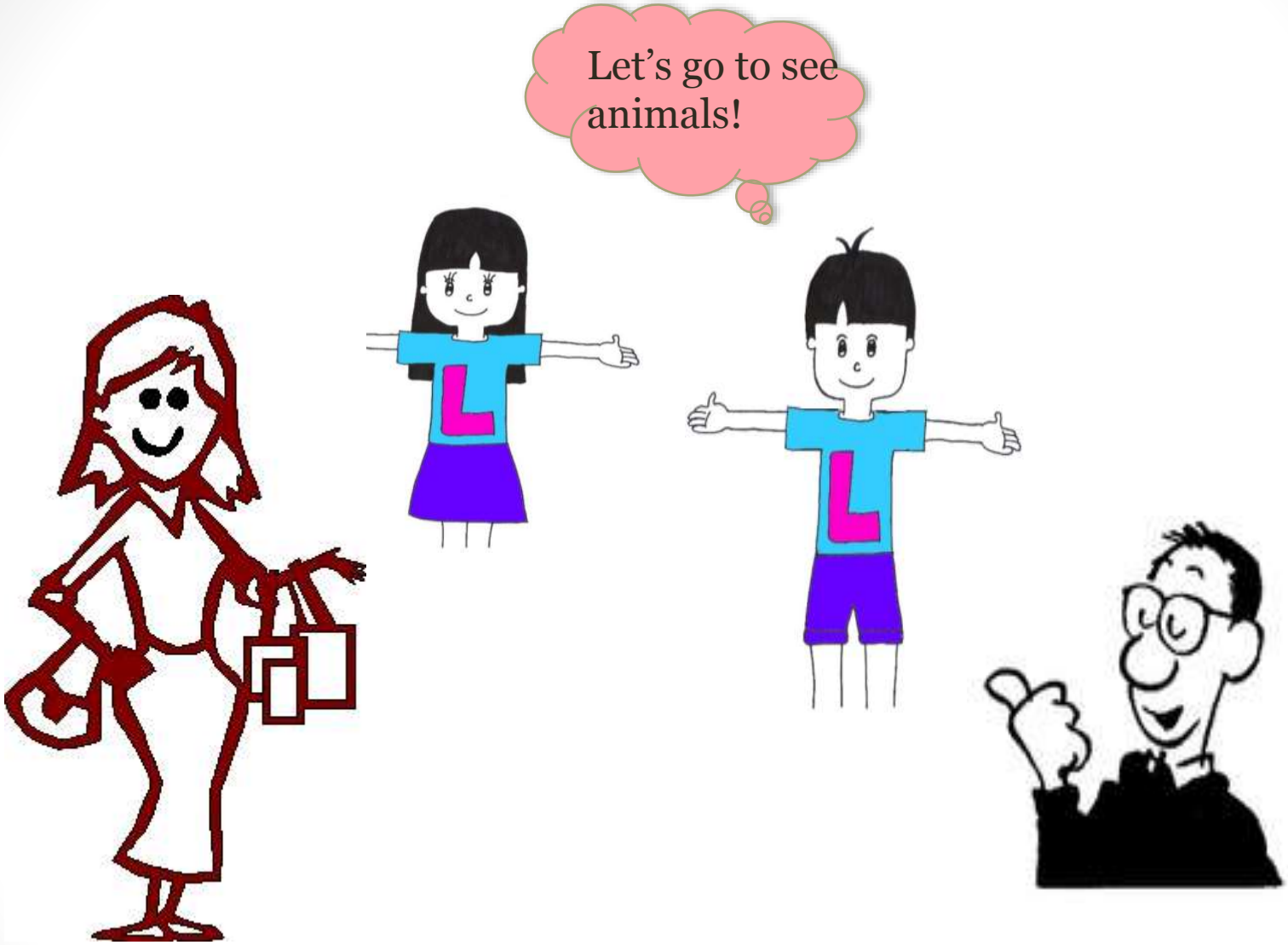
What are we going to see first, second, third, etc.?



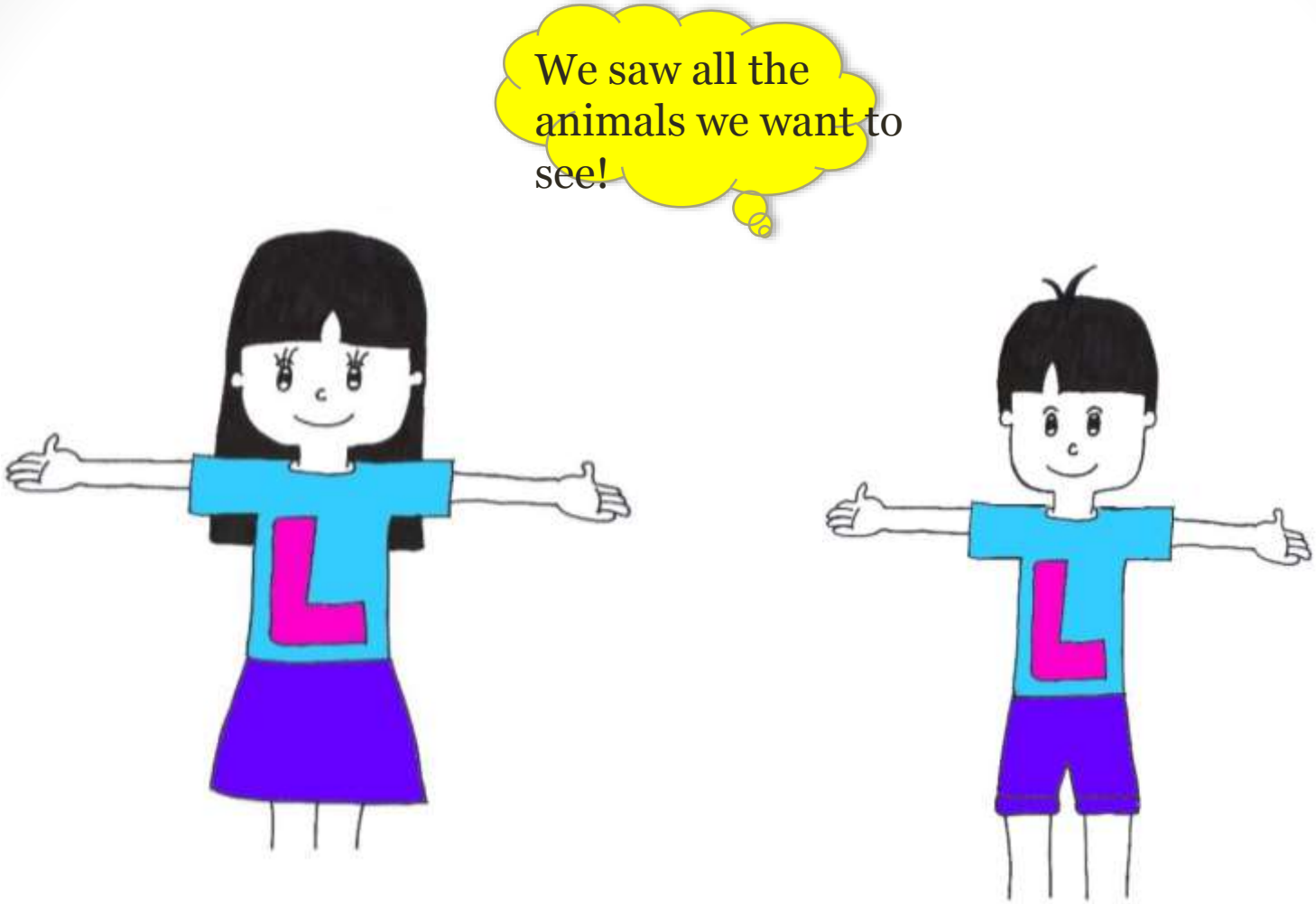
Stage 2: Plan



Stage 3: Check

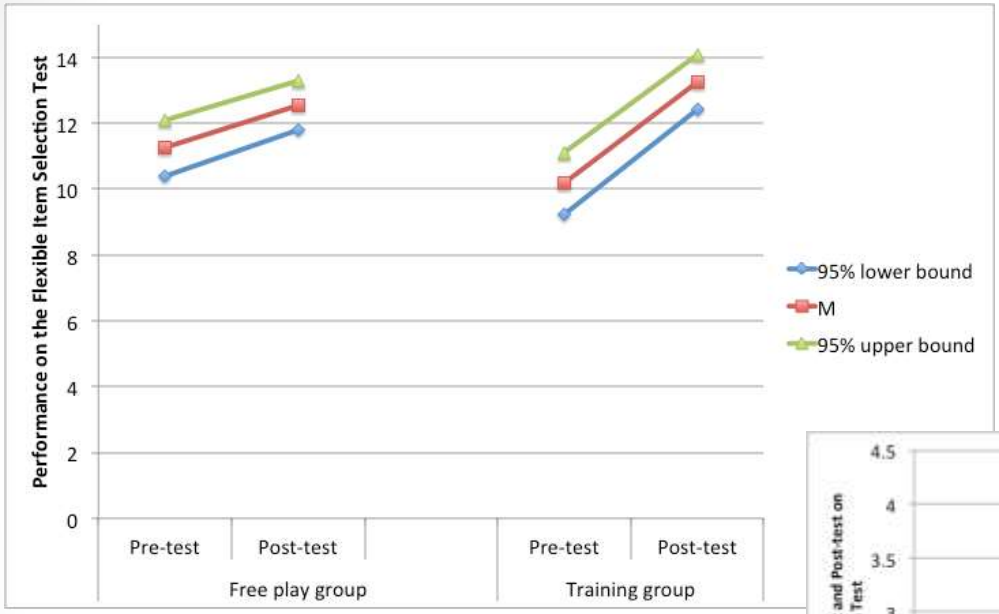


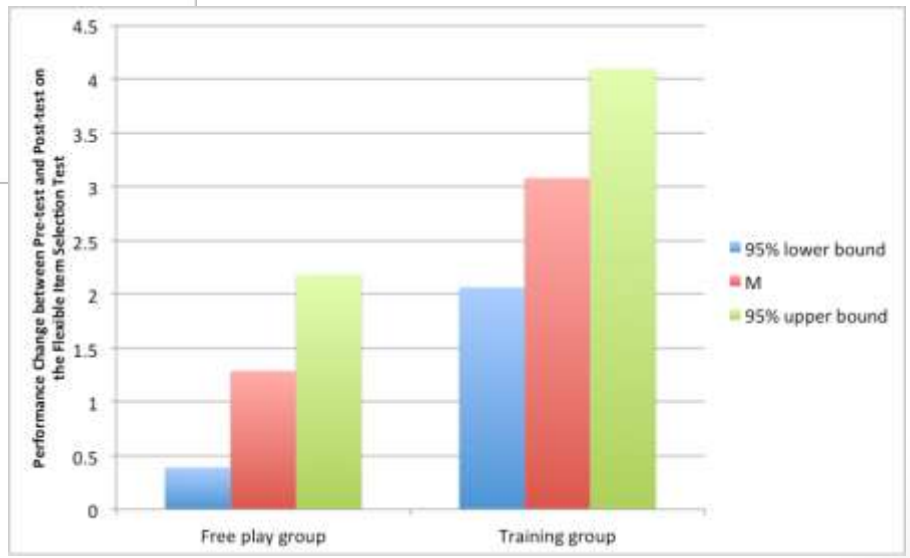
Stage 4: Do



Stage 5: Check again!

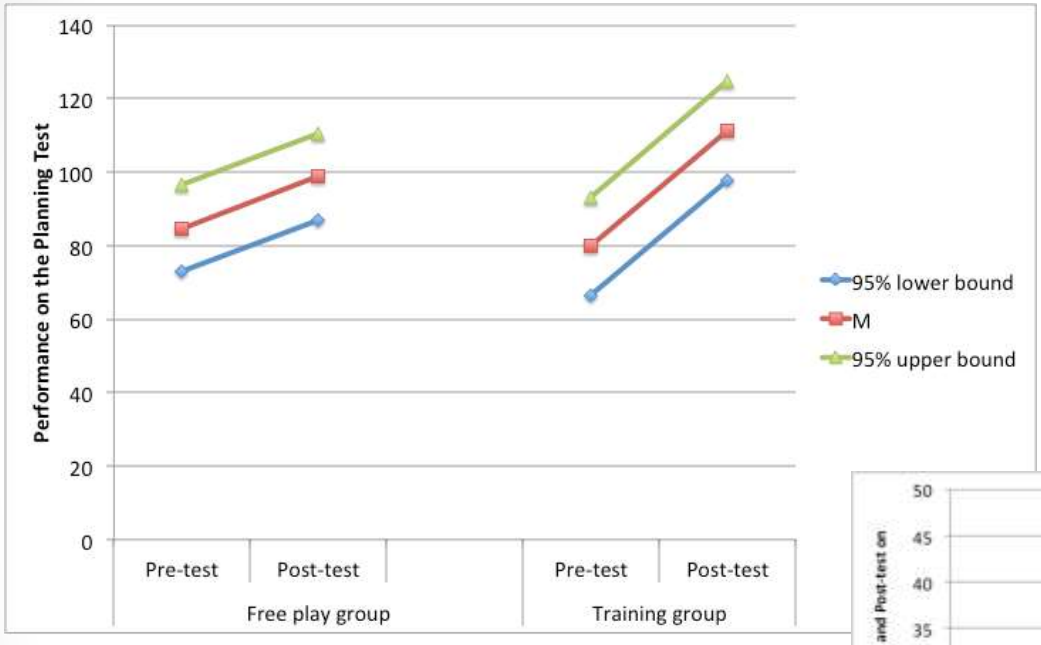
Results: Cognitive flexibility

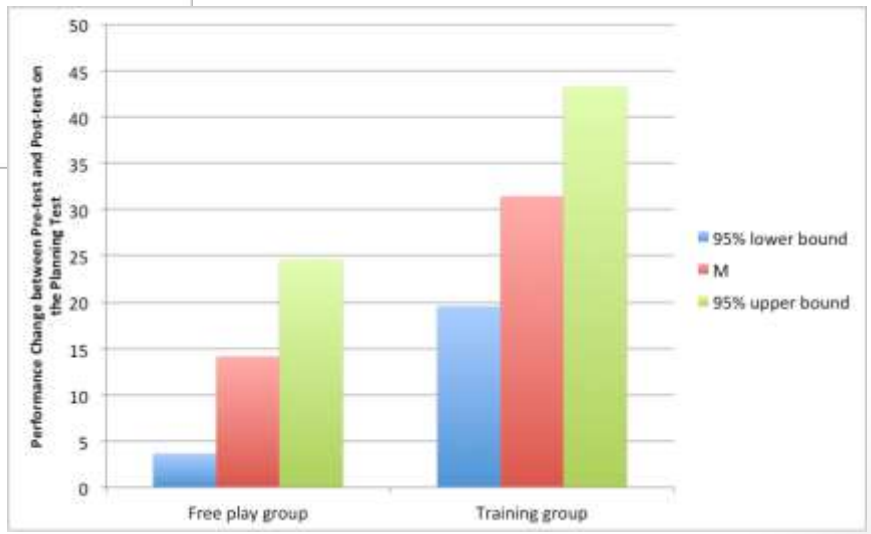




Test Time X Condition: $F(1, 69) = 6.96$, $p = .001$, $\eta_p^2 = .09$

Results: Planning





Test Time X Condition: $F(1, 69) = 4.74$, $p = .003$, $\eta_p^2 = .06$

Discussion

- It is important to promote the early development of executive function.
- It is possible to promote the development of executive function in pre-schoolers.

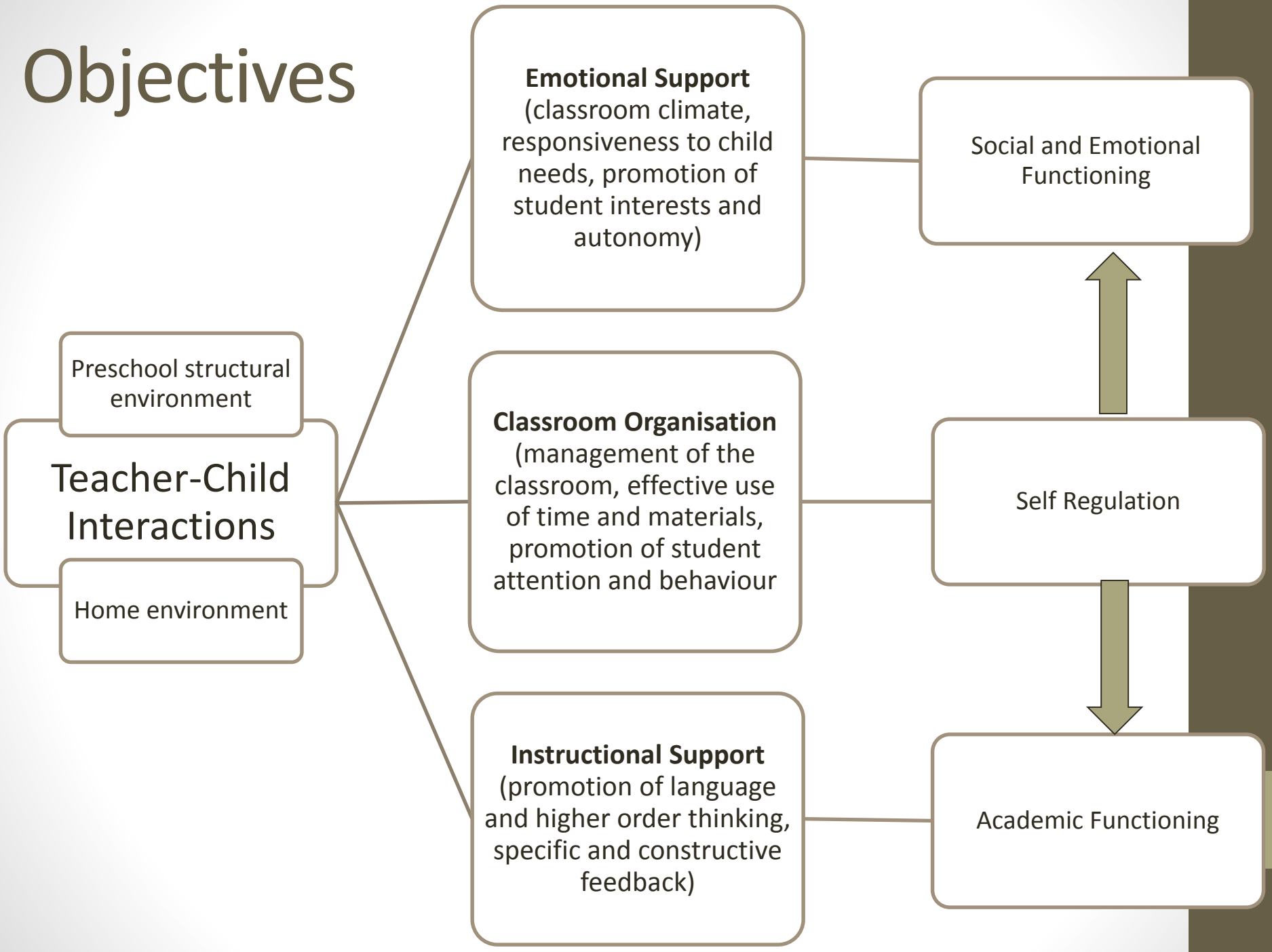
Implications

- Computerized training programs designed to improve executive function can be used at home as well as at preschools.
- Group-based training programs designed to promote the early development of executive function can be used as curricular or extra-curricular activities at preschools.
- Parents and early childcare providers can help children develop executive function, self-regulation, and problem-solving abilities through daily activities.

NIE
NATIONAL INSTITUTE OF EDUCATION
SINGAPORE

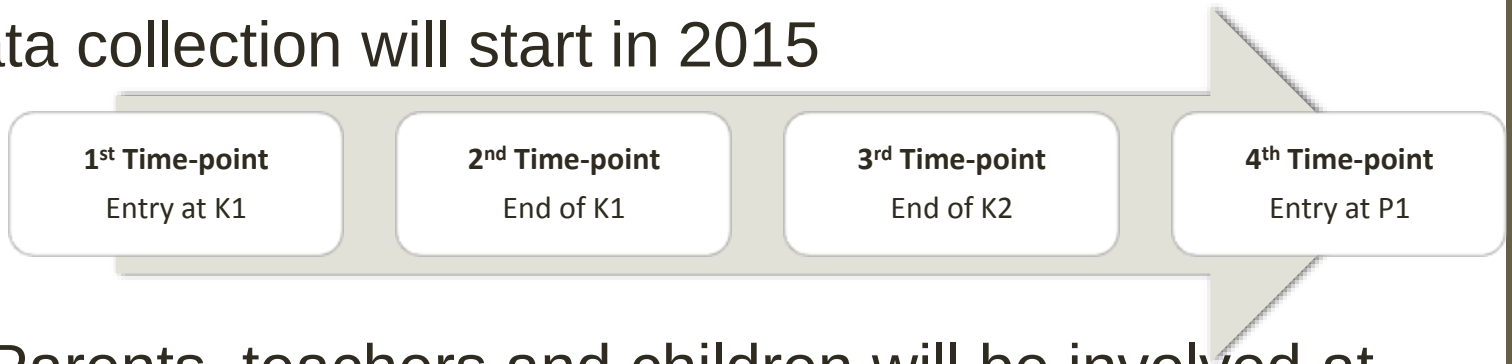
Preschool Impact Upon Child Outcomes: A Longitudinal Study of Transition from Preschool to Primary

Objectives


Preschool structural environment
Teacher-Child Interactions
Home environment
Emotional Support (classroom climate, responsiveness to child needs, promotion of student interests and autonomy)
Classroom Organisation (management of the classroom, effective use of time and materials, promotion of student attention and behaviour
Instructional Support (promotion of language and higher order thinking, specific and constructive feedback)
Social and Emotional Functioning
Self Regulation
Academic Functioning

The Study

- We aim to recruit 1500 children from approximately 75 preschools
- Data collection will start in 2015



  - Parents, teachers and children will be involved at each time-point.
    - Child's home environment and teacher's professional demographics from the parents and the teachers
    - A battery of child outcome measures will be used across all time-points to assess the children's skills
    - Classroom observations on the 1st and 3rd time point to examine the quality of teacher-child interaction

WHAT WILL WE LEARN

- Understanding of the quality of learning environments in Singapore and how they relate to child outcomes and school readiness
- We will be able to provide information on whether certain teacher-child interaction styles or certain process factors are better suited to particular children.
- Through teacher-education and professional development courses, and the provision of best practice resources, relations between different types of practice and child outcomes can be described, explained and justified

NIE

(Rebecca Bull, Kerry Lee, Beth O'Brien, Nirmala Karuppiah, Kenneth Poon, Philip Towndrow, Alfredo Bautista)

Specialties: child development and learning; cognition and self-regulation; socio-emotional functioning; language, literacy, and reading; numeracy and maths; early childhood and special needs; preschool curriculum; classroom observation and pedagogy; teacher professional development; qualitative analysis; statistical modelling

MOE

(Leong Pik San, Tan Ching Ting, Lim Meow Hwee, Tan Guat Hoon, Elizabeth Pang)

Specialties: Preschool education and curriculum; literacy development

International Advisory Board

(Nirmala Rao, HK; Donna Berthelsen, Australia; Chih-Ing Lim, USA)

Specialties: Early childhood development, education, preschool quality, child outcomes, early intervention, longitudinal studies, cultural, linguistic, and ability diversity, multivariate statistics, structural equation modelling