

# Giocare con le quantità per potenziare il senso del numero nella scuola dell'infanzia

H. M. Costa, M. C. Passolunghi, B. Nicholson, C. Donland & J. Van Herwegen



# L'importanza della matematica

- 5–10% dei bambini: serie difficoltà con l'acquisizione delle competenze matematiche (Barbaresi et al., 2005; Shalev et al., 2005)



- **FATTORE DI RISCHIO**  
(Bynner & Parsons, 2006; Geary et al., 2013)



- Identificare i precursori ➡ Prevenzione precoce

# Apprendimento matematico

- Abilità misurate in età prescolare predicono le successive prestazioni in matematica

**MEMORIA**

**ATTENZIONE**

Precursori  
dominio-generalisti

QI

Precursori  
dominio-specifici

(Krajewski & Schneider, 2009; Kroesbergen, Van Luit, & Auno, 2012; Mazzocco & Thompson, 2005; Passolunghi & Lanfranchi, 2012).

# Precursori dominio-specifici

- **Conteggio**
  - filastrocca dei numeri (Gelman & Gallistel, 1987)
  - corrispondenza uno a uno
  - cardinalità
- **Riconoscimento di numeri**
- **Subitizing**
- **Approximate Number System (ANS)**



(Berch, 2005; Jordan et al., 2007; Pasolunghi & Lanfranchi, 2012)















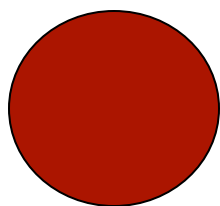
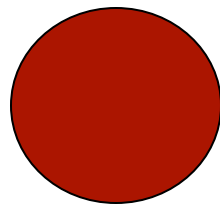
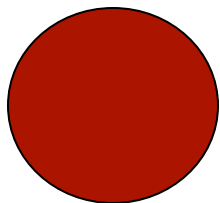
# Precursori dominio-specifici

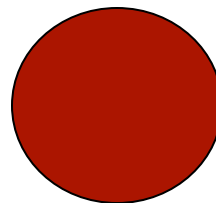
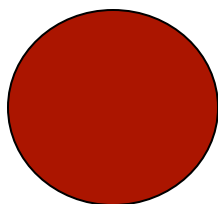
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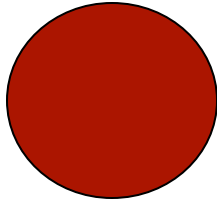
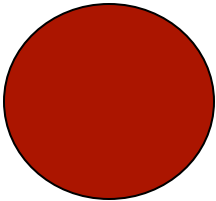
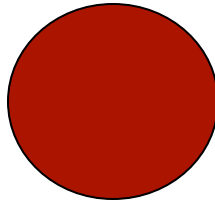
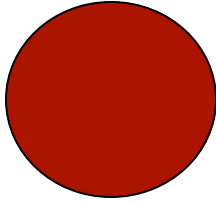
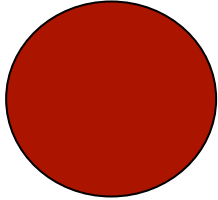


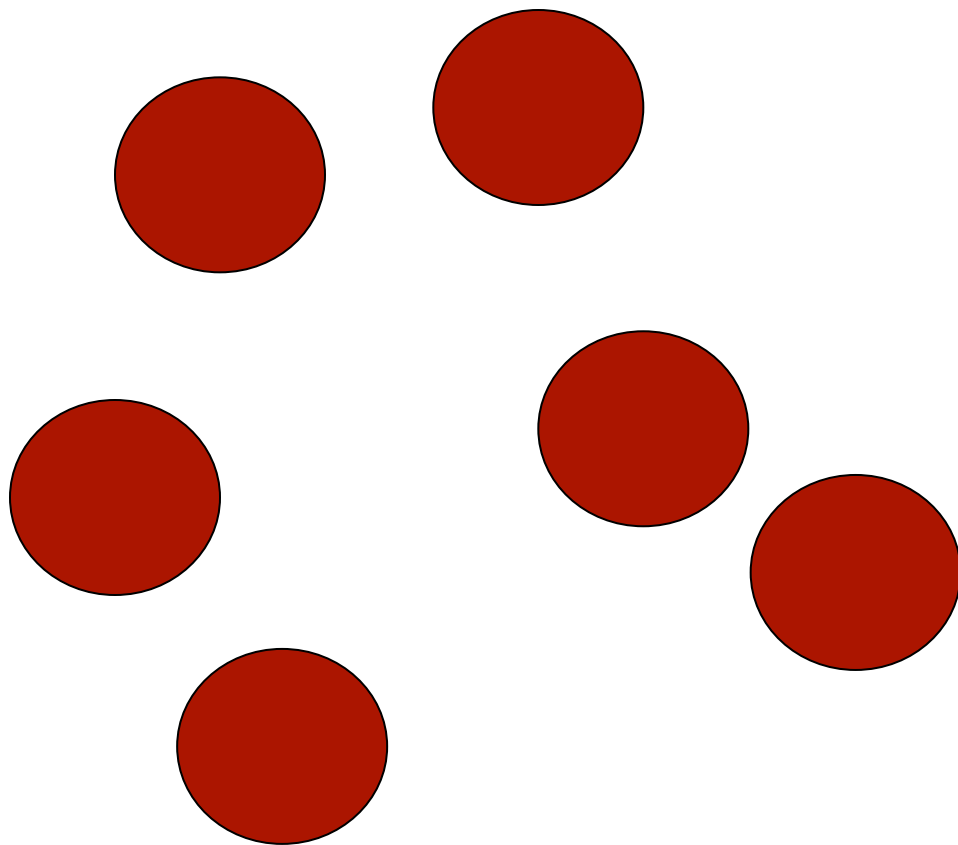
(Berch, 2005; Jordan et al., 2007; Pasolunghi & Lanfranchi, 2012)



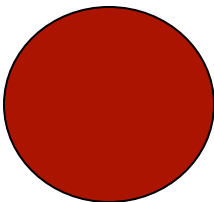
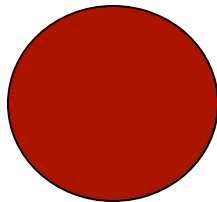
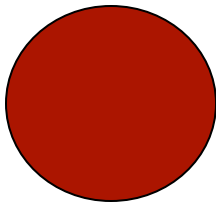
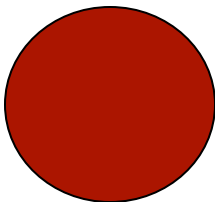
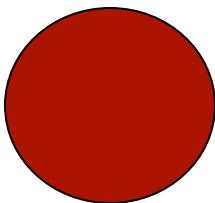
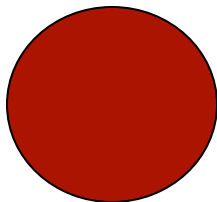
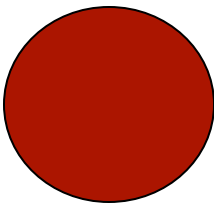
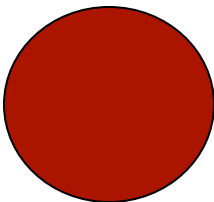


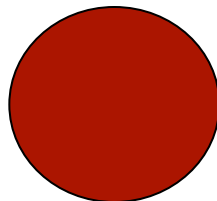
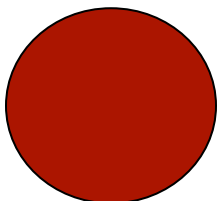
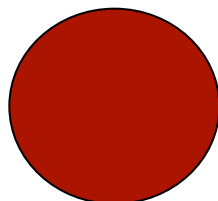
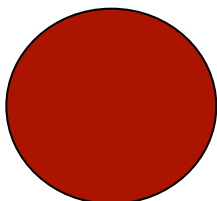
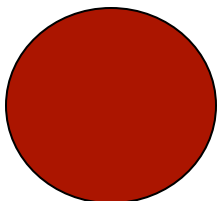
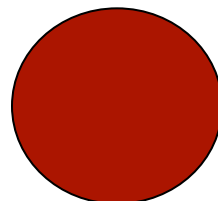
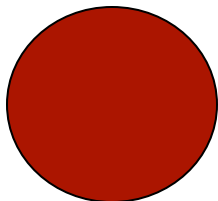
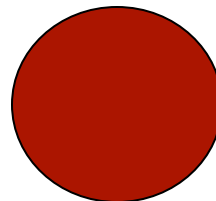
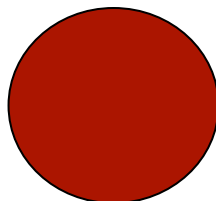
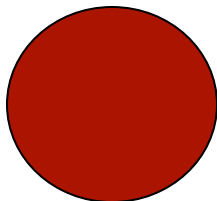












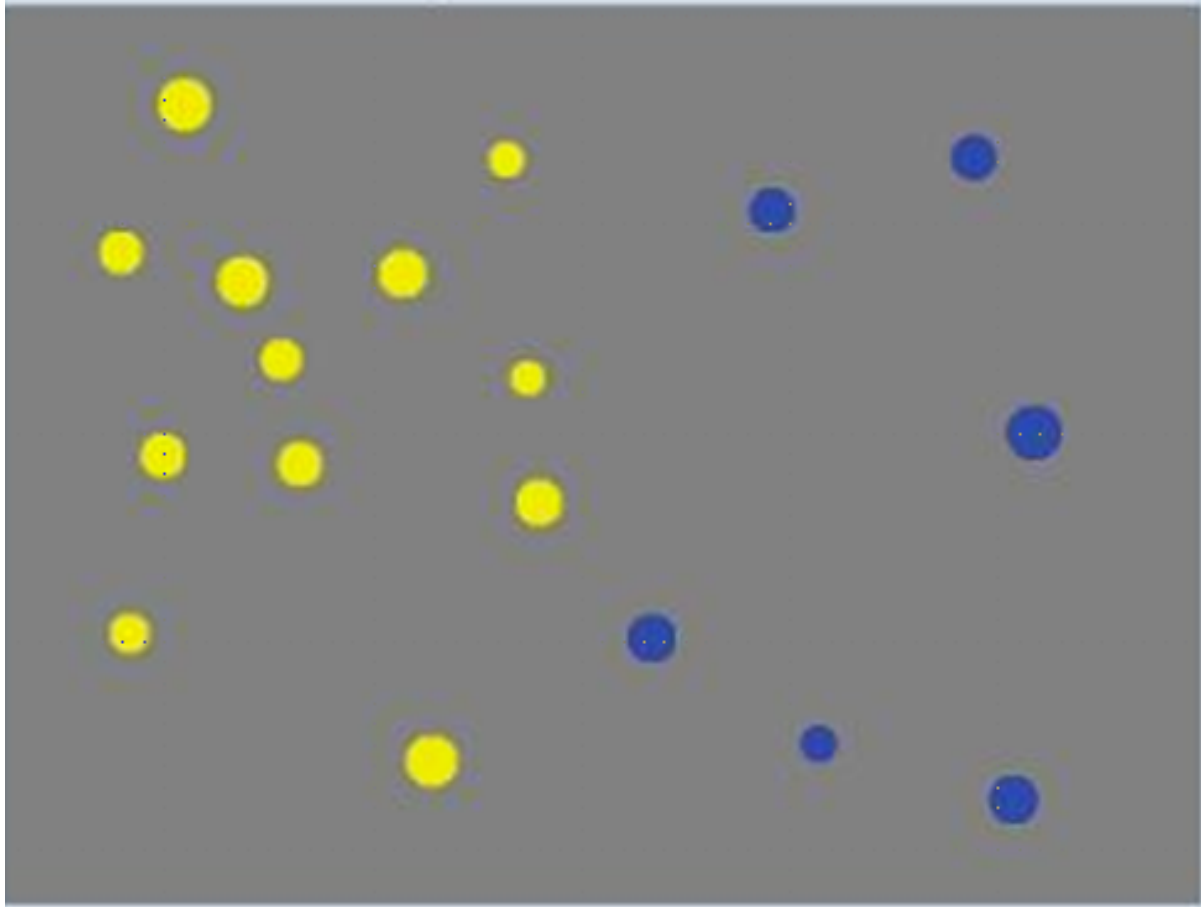


# Precursori dominio-specifici

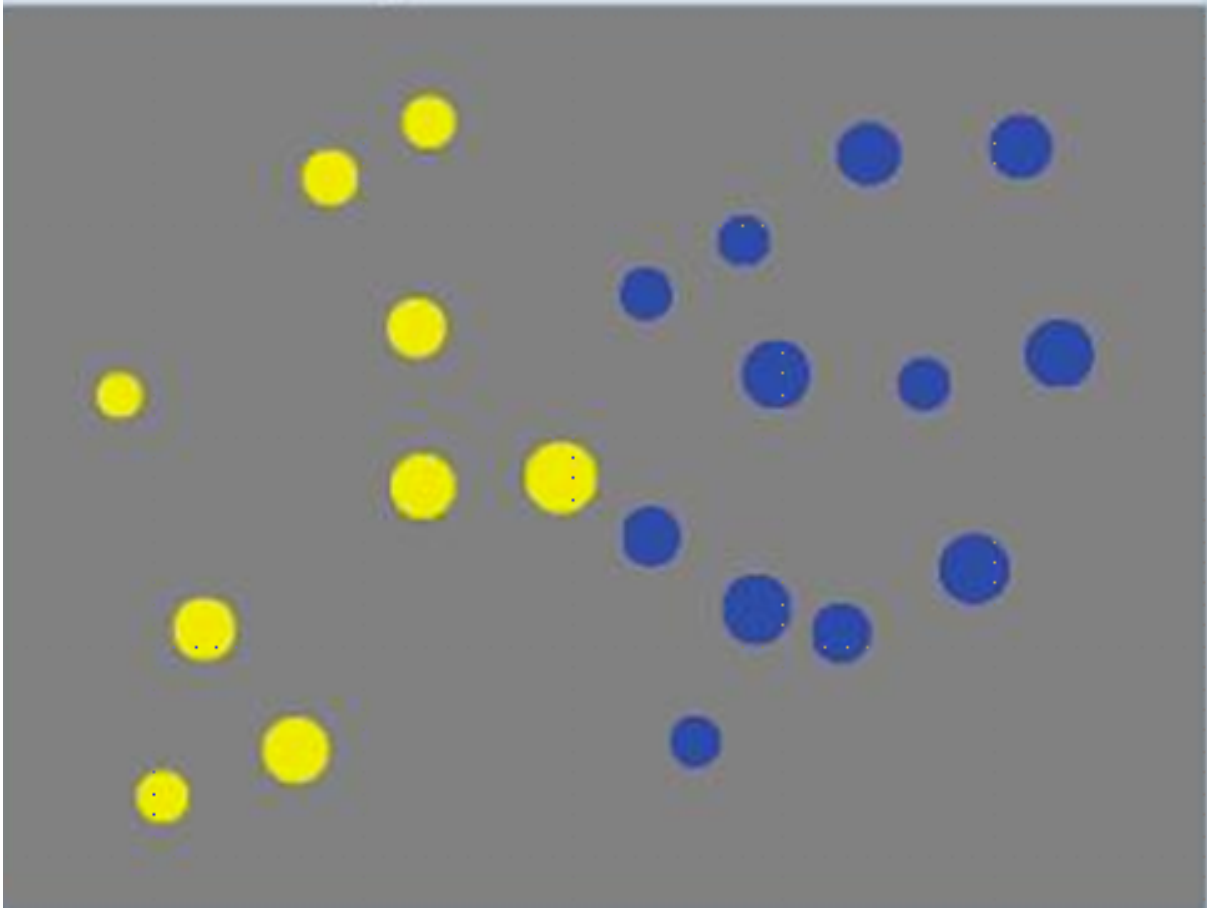
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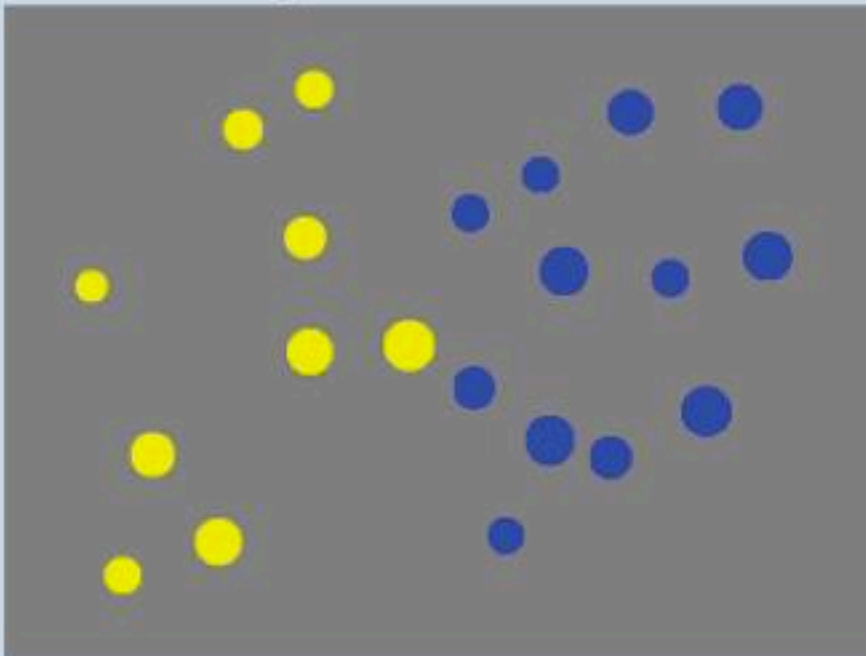




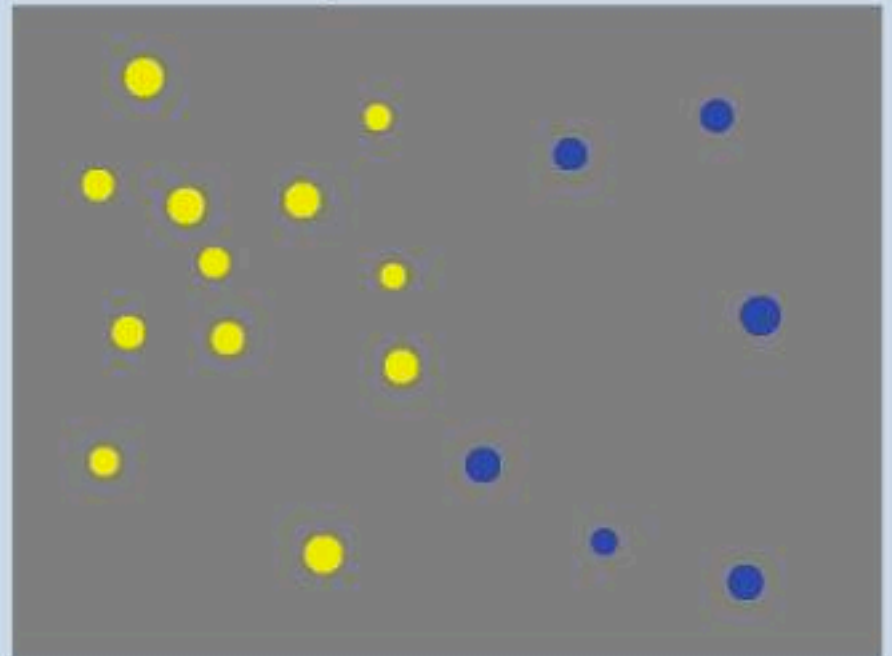


# Approximate Number System

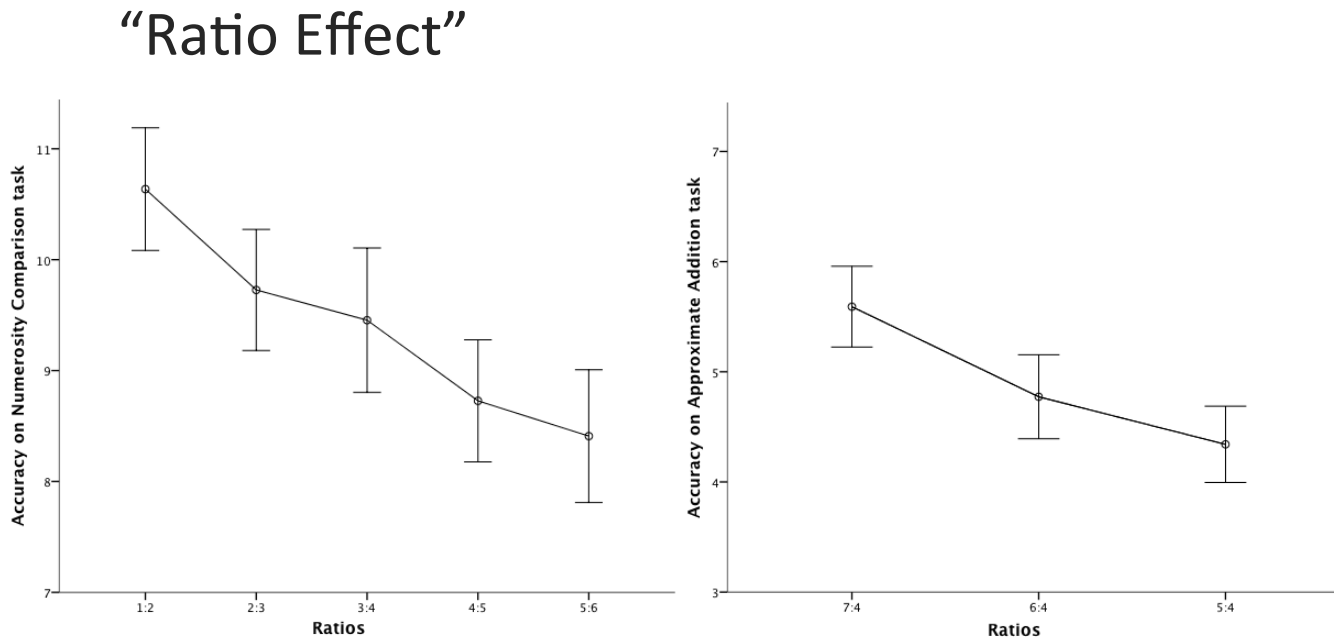
**Harder Trial**  
9 yellow vs 12 blue



**Easier Trial**  
12 yellow vs 6 blue



# Approximate Number System



**Figure 3.** Group means for preschoolers' performance in ANS tasks as a function of the size of the numerical ratio between item arrays. Group mean values correspond to number of correct trials for different levels of ratio size. Error bars are 95% confidence intervals.

(Barth, Kanwisher, & Spelke, 2003; Halberda & Feigenson, 2008)

# Approximate Number System

ANS  MATEMATICA

- l'accuratezza in compiti di ANS in età prescolare predice l'apprendimento matematico nella scuola primaria (Mazzocco et al. 2011).
- Bambini con MLD sono caratterizzati da deficit nell'ANS (Piazza et al., 2010)

Tuttavia:

- direzionalità?
- Alcuni studi non confermano la relazione

(De Smedt et al. 2013; Mussolin et al., 2012)

# PLUS GAMES

## Improving Preschoolers' Number Foundations

Instruction Manual

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Prof. Chris Donlan<sup>2</sup>

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Miss Bethany Nicholson<sup>1</sup>

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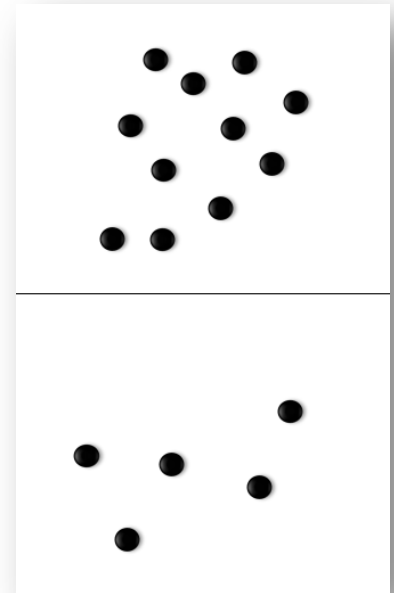
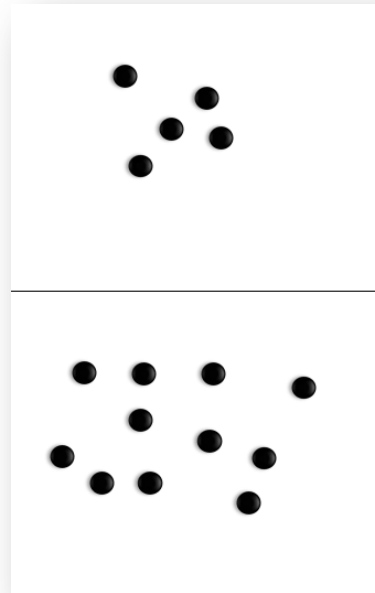
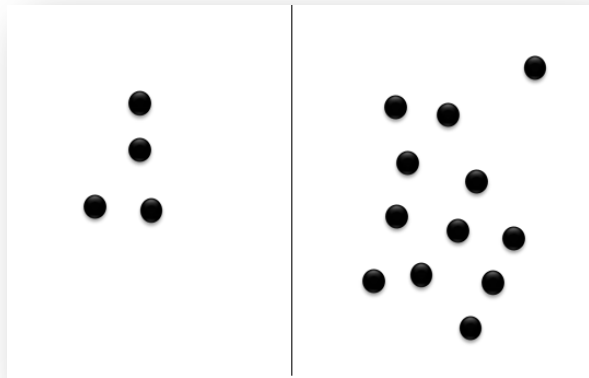
\*Corresponding author. Psychology Department, Kingston University London, UK.

E-mail address: j.vanherwegen@kingston.ac.uk (Jo Van Herwegen).

- Confronto di quantità
- No conteggio
- Giochi a coppie
- 10 min al giorno
- Training adattivo

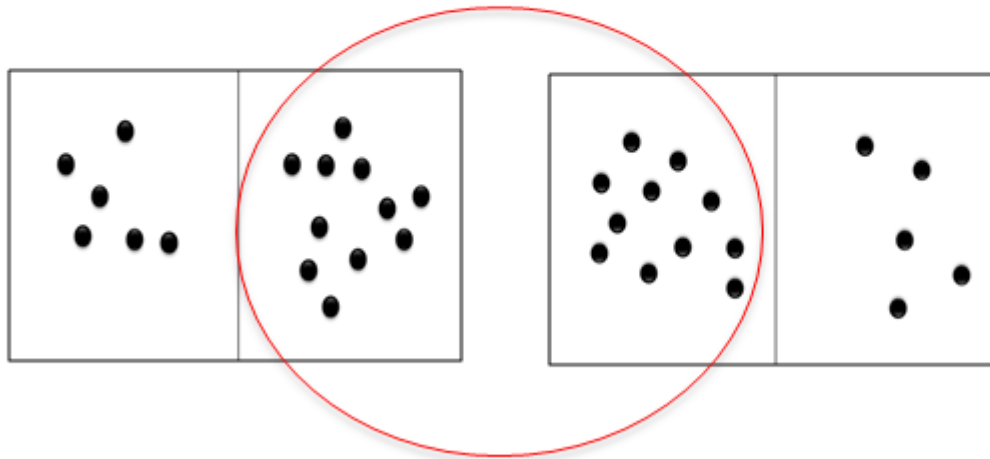
# PLUS GAMES

## IL DOMINO



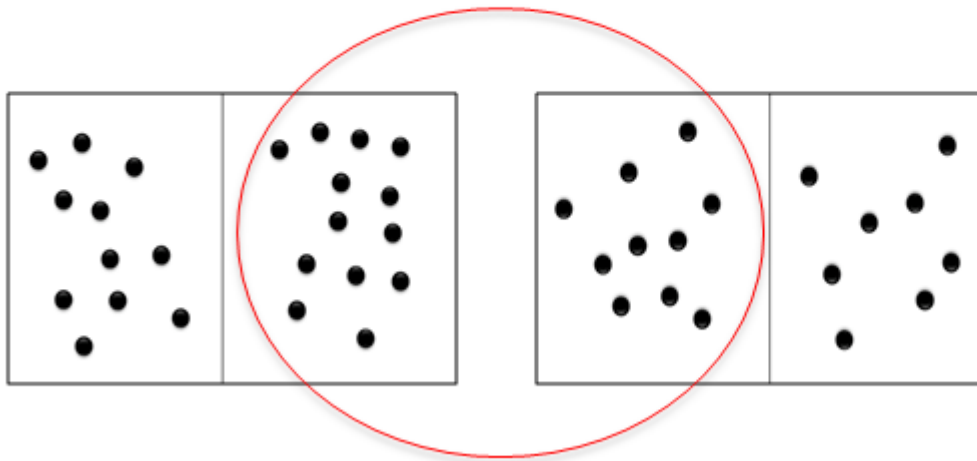
# PLUS GAMES

RAPPORTO 1/2



# PLUS GAMES

RAPPORTO 4/5



# PLUS GAMES

## SUONA I NUMERI

“con quale strumento ho suonato più volte?”





# PLUS GAMES

NEL CALZINO



# PLUS GAMES

NEL CALZINO

“Dove ci sono più palline?”



# PLUS GAMES

## CARTE IN LINEA

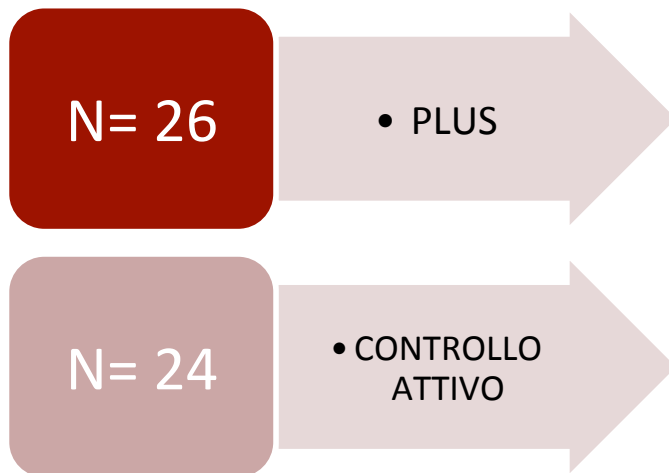


- Van Herwegen, J., Costa H.M. & Passolunghi M.C. (2016). Improving Approximate Number Sense Abilities in Preschoolers: PLUS Games.
- Verificare l'efficacia di un programma di intervento focalizzato sul **confronto di quantità**
  - sulle abilità di ANS
  - sull'apprendimento matematico

# PLUS GAMES – Studio 1

## Partecipanti e metodo

50 bambini della scuola dell'infanzia (4-5 anni)



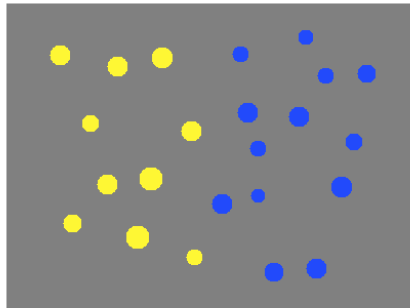
pre-test
W1 training
W2 training
W3 training
W4 training
W5 training
post-test

# PLUS GAMES – studio 1

## Misure Cognitive:

ANS

“Chi ha  
più  
pallini?”



An example display from Panamath. Are there more yellow dots or blue dots?



MATEMATICA



(Eliot & Smith, 2011)

IQ

- Verbale: Vocabolario ricettivo
- Non verbale: Disegno con i cubi

(WPPSI-3; Wechsler, 2002)

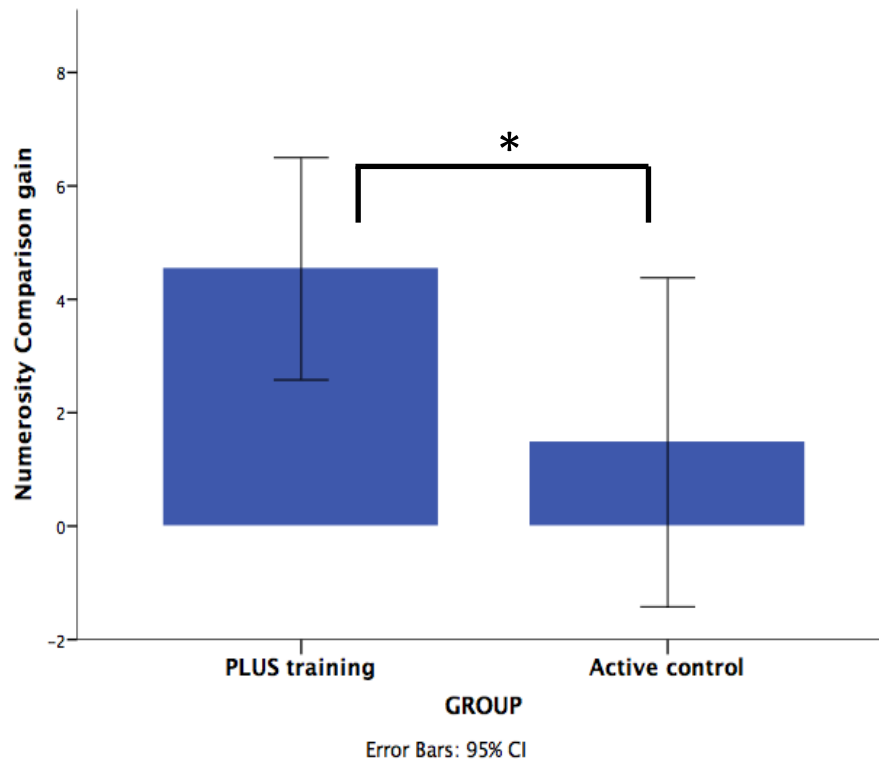
# PLUS GAMES – studio 1

- Controllo attivo: **attività di lettura guidata**
- Promozione delle abilità linguistiche e di letto-scrittura.
- sviluppo di
  - abilità di attenzione
  - ascolto
  - creatività



# PLUS GAMES – studio 1

## Risultati



### Approximate Number System

$$F(1,41) = 5.04, p = .03, \eta_p^2 = .11$$

$$\rightarrow (r(23) = -.64, p = .001)$$

### Abilità Matematiche

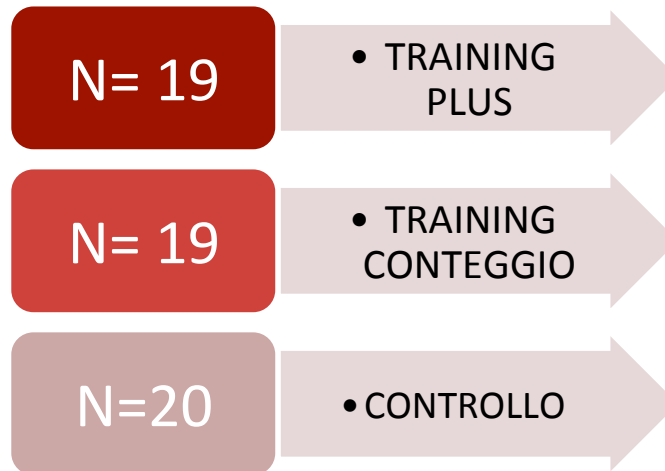
$$F(1,41) = .59, p = .45, \eta_p^2 = .01$$



# PLUS GAMES – Studio 2

## Partecipanti e metodo

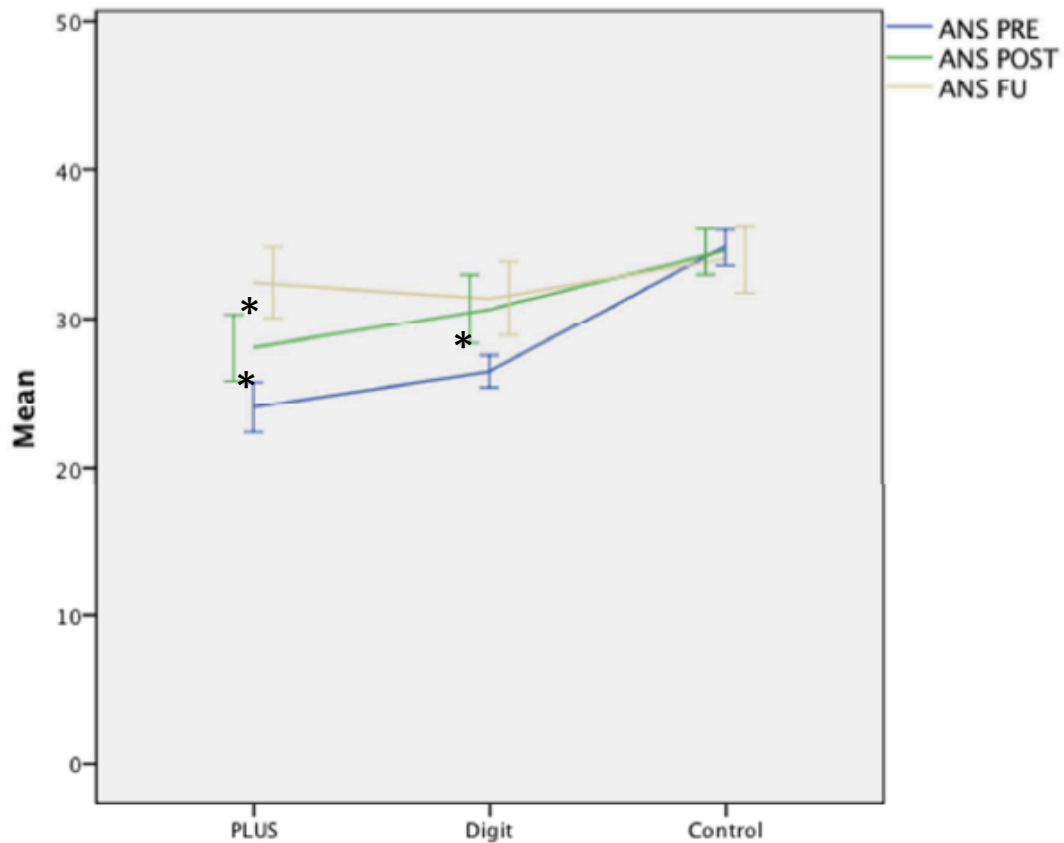
- Screening su 283 bambini (scuola infanzia)
- **49 bambini a rischio di MLD**



pre-test
W1 training
W2 training
W3 training
W4 training
W5 training
post-test
follow-up

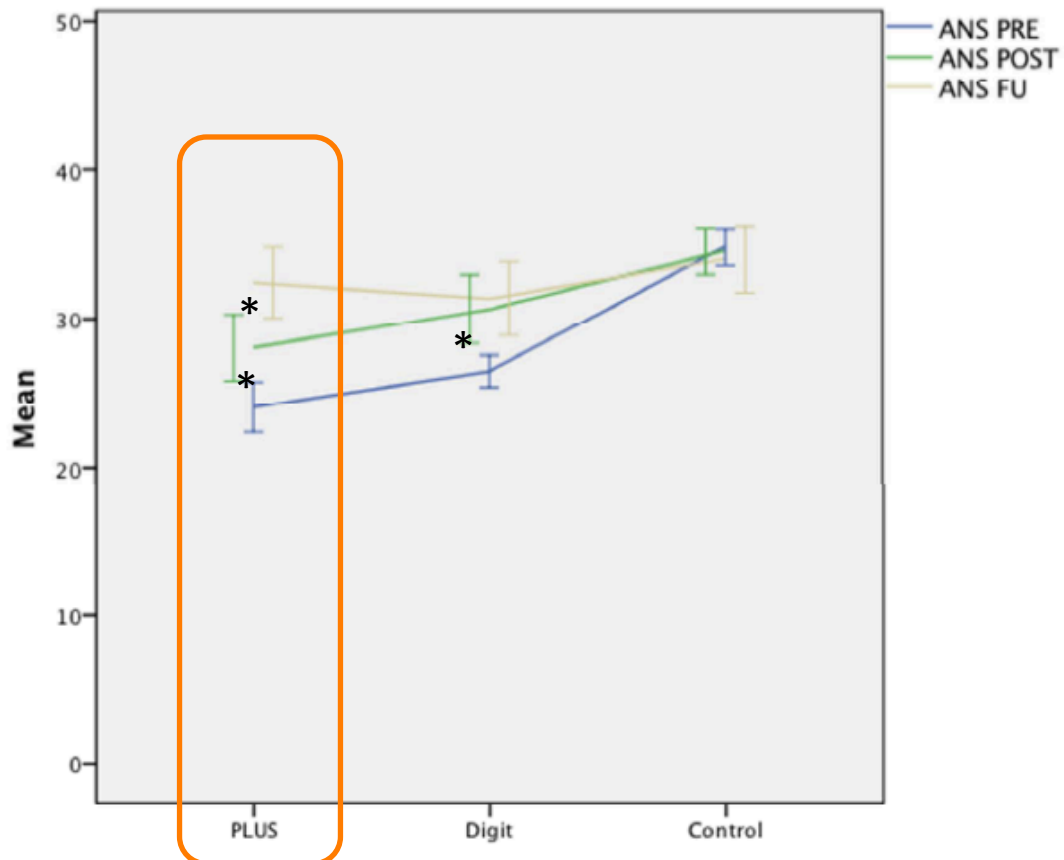
# PLUS GAMES - studio 2

## Risultati ANS



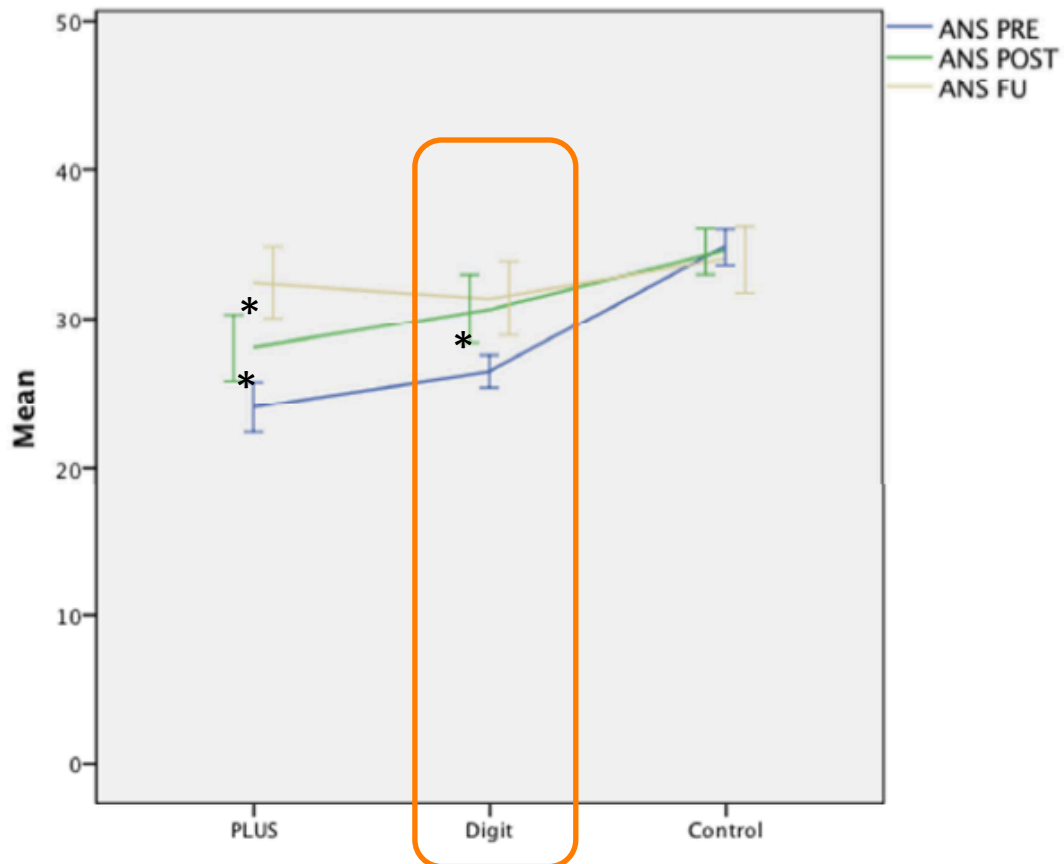
# PLUS GAMES - studio 2

## Risultati ANS



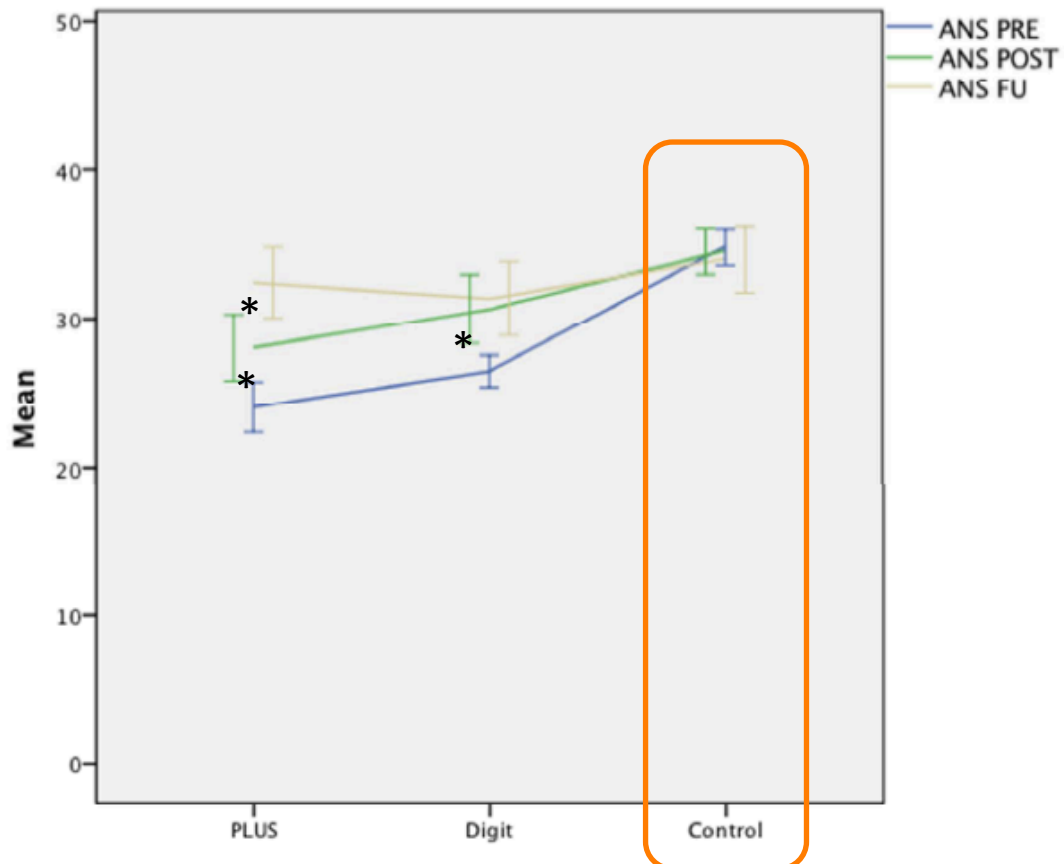
# PLUS GAMES - studio 2

## Risultati ANS



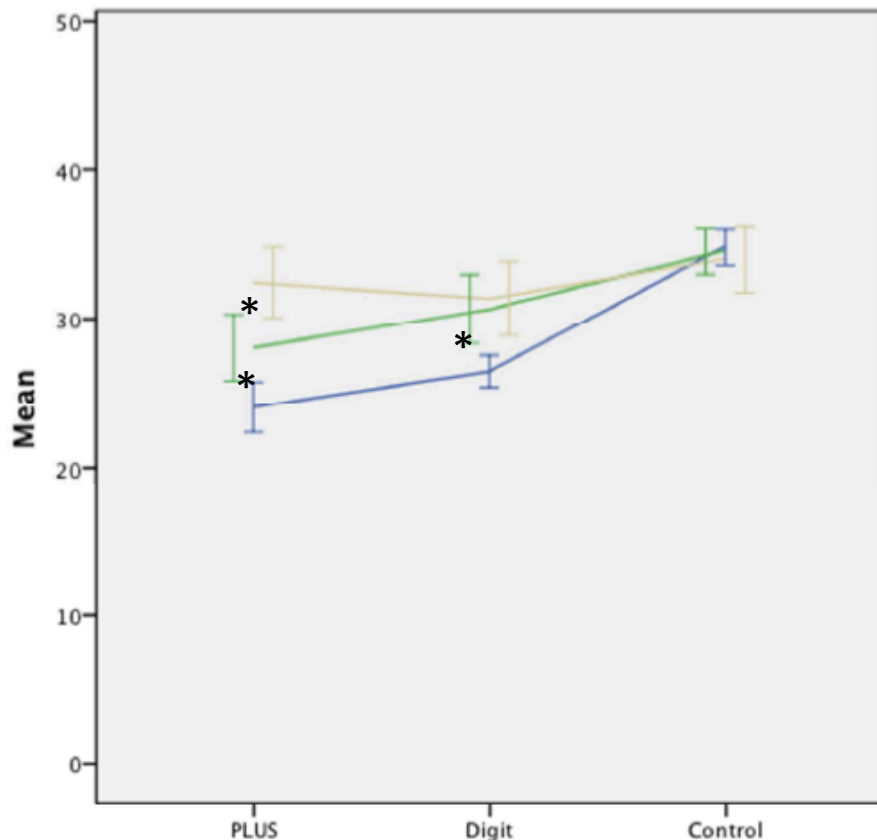
# PLUS GAMES - studio 2

## Risultati ANS



# PLUS GAMES - studio 2

## Risultati ANS



## Risultati matematica

→ miglioramento tra pre-test e post-test ( $p < .001$ ) e tra post-test e follow-up ( $p < .001$ ) in entrambi i gruppi sperimentali.

→ nessun miglioramento nel gruppo di controllo

# Conclusioni

- Malleabilità dell' ANS in età prescolare
- Specificità effetto PLUS GAMES nei bambini a sviluppo tipico
- Possibilità di lavorare sul simbolico (conteggio, riconoscimento di numeri) e sul non simbolico (ANS) per favorire l'apprendimento matematico in bambini a rischio di MLD
- Considerare i profili cognitivi dei bambini a rischio nella pianificazione dell'intervento precoce.

# Grazie a ...

## Collaboratori

- Prof Maria Chiara Passolunghi
- Prof Chris Donlan, UCL, UK
- Dr Dr Jo Van Herwegen
- Beth Nicholson

Kingston  
University  
London



## Studenti

- Erica Ranzato
- Sara Marega
- Ruggero de Agostini
- Lara Termini
- Zuber Mohammed



Tutti I bambini e le insegnanti delle scuole coinvolte