

# “Multilingualism and Multiliteracy in primary school children in India”: Overview of the project

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**The languages of education in multilingual India:  
exploring effects in reading and mathematics**

Shangri-La Hotel, New Delhi

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# The trigger



Problem:

**Causes of low learning outcomes** of primary school children in multilingual India



Context:

**Advantages to being bilingual or multilingual** in attention and learning skills



Research question:

**Why do some children in India not benefit** from being bilingual or multilingual to the same degree as children in other contexts?

# Background



**Bilingualism** has been shown to have beneficial effects on:

- a. working memory
- b. flexibility, attention resources and inhibition of inappropriate/incorrect responses

**Delay of dementia** and cognitive decline in the elderly (Alladi et al 2013; 2014)

## **Creativity**

Creativity as a measure of *divergent* thinking: subconscious process involving a broad search for information and the generation of numerous alternative answers or solutions to a problem (Guildford 1967) -(Kharkhurin 2012, for adults; Leikin 2012, for children)

# Multilingualism and Multiliteracy: Raising Learning Outcomes in challenging contexts in primary schools across India (May 2016 – April 2020)



Research jointly supported by the ESRC and DFID

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Suvarna Alladi, NIMHANS



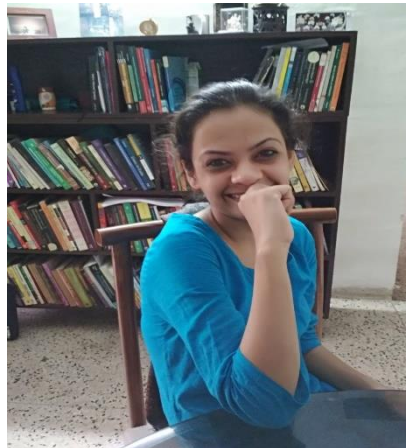
Minati Panda, JNU



Lina Mukhopadhyay, EFL-U

DELHI TEAM

Prof. Minati Panda



Nainy Rao



Shitika Chowdhary



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Yashika Chandna

# HYDERABAD TEAM




Prof.  
SUVARNA  
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JOSHUA REDDY



JYOTHI M



FEBA VARGHESE

## PATNA TEAM (who also worked in Hyderabad)



Dr Lina Mukhopadhyay (EFL-U)

-- Shravasti Chakrabarti

-- Kankan Das

---Vasim Tamboli

## Partners and Consultants

Partners:

**British Council India**

**The Language and Learning Foundation**

Consultants (Advisory Board – Impact Board):

Debanjan Chakrabarti, British Council India

Rama Mathew, Delhi University

Ganesh Devy, Dhirubhai Ambani Institute of ICT

Dhir Jhingran, The Language and Learning Foundation

Ajit Mohanty, Jawaharlal Nehru University

Vasanta Duggirala, Osmania University

Bapi Raju International Institute of Information Technology



# Impact

- Capacity-building: at least 15 junior researchers working on the project at the moment; trained and actively engaged in research ethics, design, methods, data entry and analysis.
- We hope that our project will contribute to the current discussions in India about what schools are expected to deliver and how.
- We also hope that the findings from this project will inform the UK about monolingual education and what benefits or challenges it implies for multilingual children.

# Learning outcomes in Indian schools



- ASER studies conducted with 600,000 children across India: more than half of all children in Standard 5 could not read a Standard 2 level text fluently, and nearly half of them could not solve Standard 2 level subtraction task.
- Low literacy and numeracy can limit other important capabilities, e.g., critical thinking and problem solving
- Low educational achievement may lead to dropping out of school
- High dropout rate in schools affecting girls more than boys (Unesco's Education Report, 2015; Annual Status of Education Report Pratham, 2014).
- The gap between state and private schools increases every year

# Education and the language of instruction



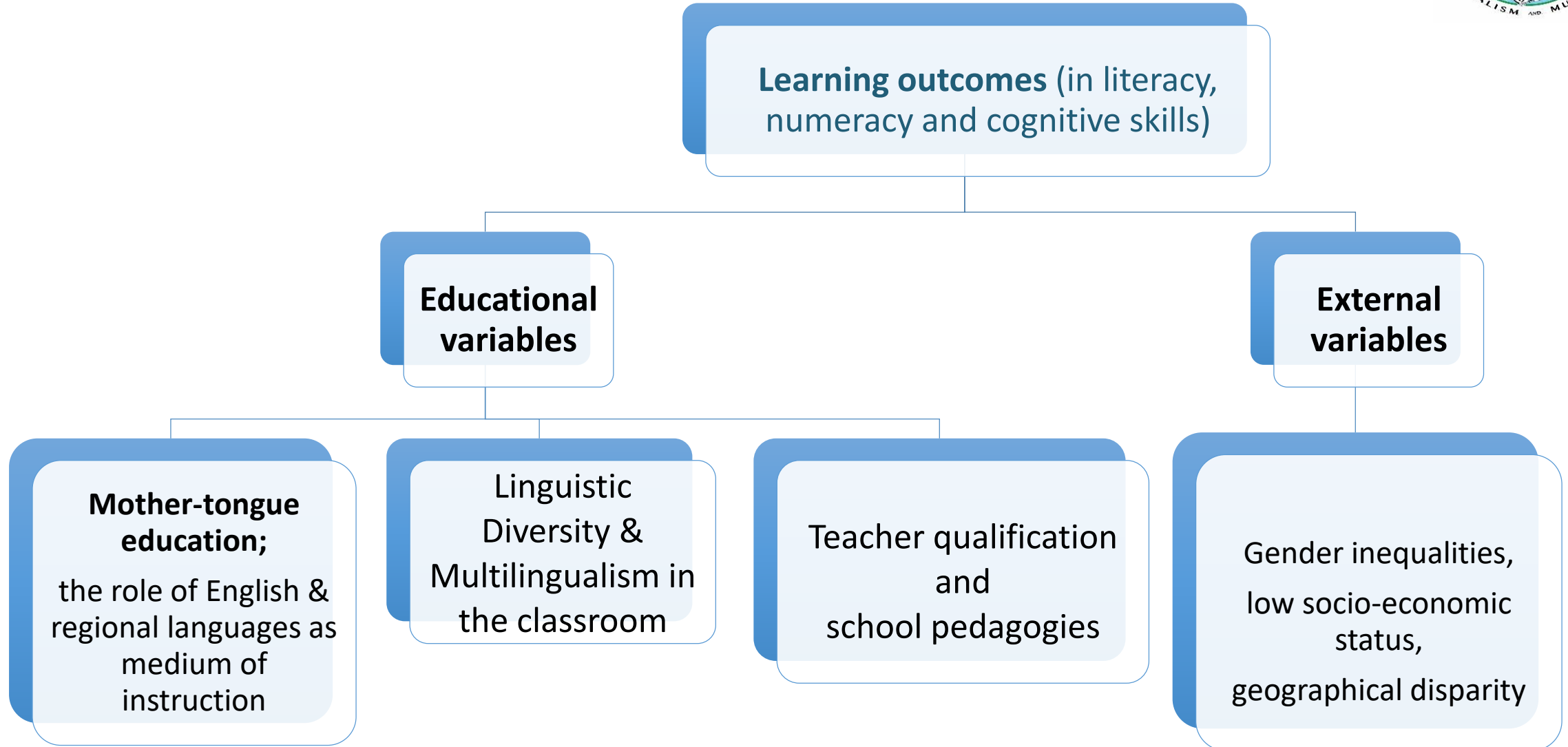
- Reports from developing countries suggest that 221 million children are educated in a language they do not speak at home

→ poor education quality, drop-out rates, low literacy outcomes (Cummins 2009)

NB: Most EAL children in the UK are monoliterate in English.

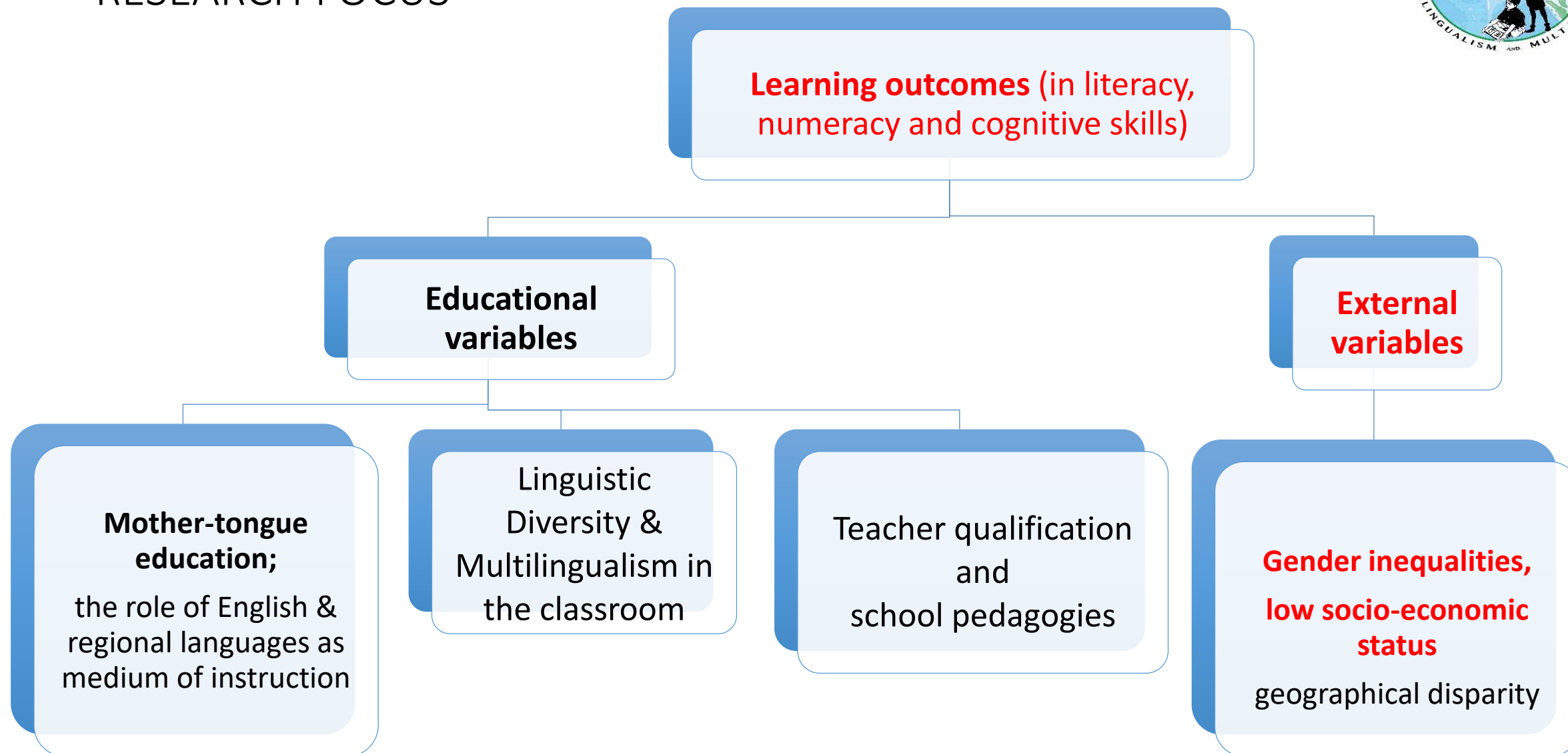


# RESEARCH FOCUS





## RESEARCH FOCUS



# Geographical and social factors

- Urban (Delhi, Hyderabad) vs. Rural (Bihar)
- Bihar is one of the less developed and educationally disadvantaged areas of India (Tsujita, 2009, Unesco EFA Report).
- Urban areas: Children in government schools living in disadvantaged, low-income settlements (slums) and children in government schools living in other areas.
- Urban slums are settlements with inadequate access to safe water, sanitation and infrastructure, poor structural quality of housing, overcrowding and insecure residential status.
- UN report 'The Challenge of Slums' (2003); "slums are a multidimensional concept involving aspects of poor housing, overcrowding, lack of services and insecure tenure; indicators relating to these can be combined in different ways to give thresholds that provide estimates of numbers of slum dwellers."

→ A large number of internal migrants who may speak other languages or varieties of the regional language live in these settlements.





# Urban slums

- School attendance rates for children living in Delhi slums and rural areas can be low.
- Around 73% of slum children attending Std I in Delhi schools are over-aged (Tsujita, 2009)

→ Inequalities in education provision



NB: The term 'slum' can be controversial.

Mayne (2017) *Slums: The History of a Global Injustice*.  
University of Chicago Press.

# How we address our questions

- We developed a **set of tools** to examine directly or indirectly the children's school skills (literacy and numeracy), their cognitive skills which *support* learning and development, their school environment (teachers, methods, attitudes)
- We use the same set of tools in each of the **sites**: Delhi, Hyderabad, Bihar (Patna and non-remote rural areas)
- We looked for government schools in *slum vs. non-slum* areas and invited all children in Std IV who were willing to participate.



# 1. Surveys and questionnaires

- **Language** questionnaire – Child (Demographic info, Language use info)
- **Headteacher** questionnaire (demographics of the school, school curriculum and instruction, teaching practice and attitude)
- **(Maths & Language) Teacher** questionnaire; (training, qualifications, language attitude (e.g. translanguaging), teaching and learning methods and materials)
- **Classroom observation** tool (Amy Lightfoot's talk)



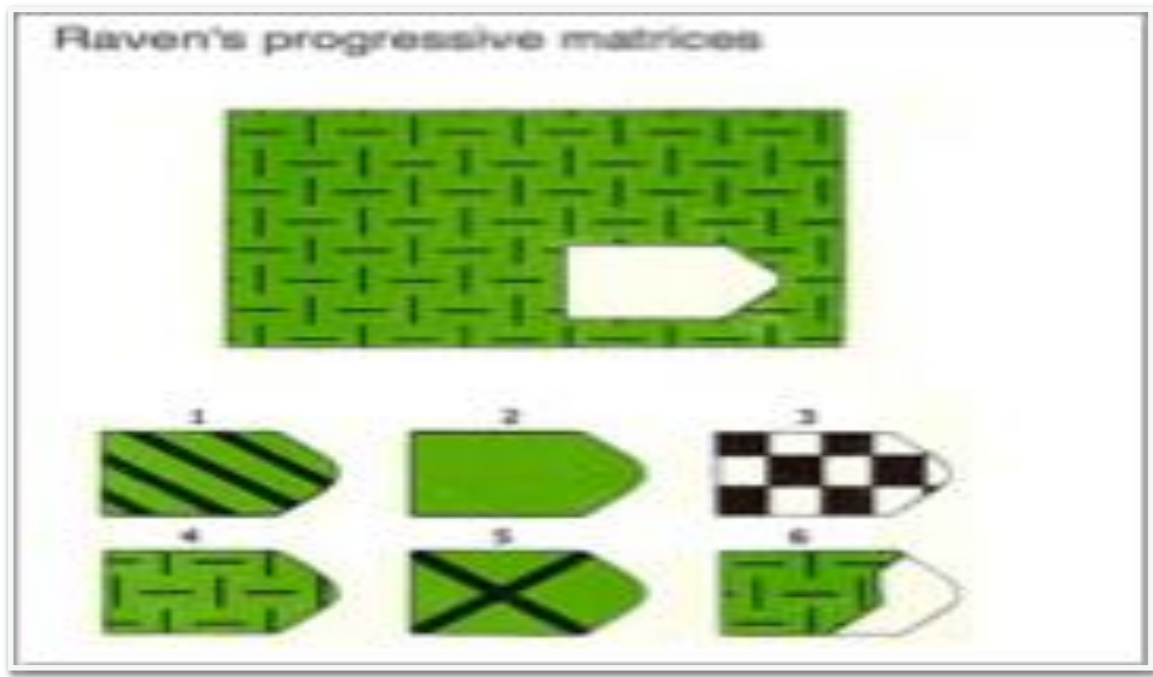
## 2. Cognitive

- General Intelligence (Raven's Progressive matrices)
- Cognitive skills supporting learning (attention and inhibition, working memory)



# Raven's Progressive Matrices

- To measure the children's general IQ scores (problem-solving skills based on information/data that is not language-based).



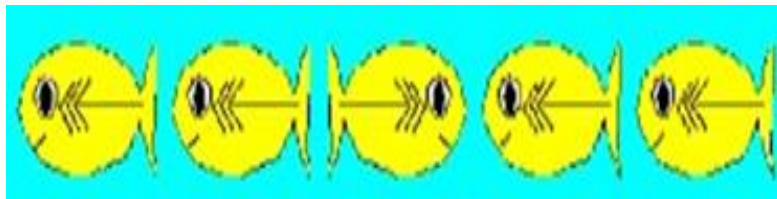


# Flanker Task

- Executive function task measuring inhibitory control.
- Reaction time and accuracy measured in conflict and non-conflict conditions.



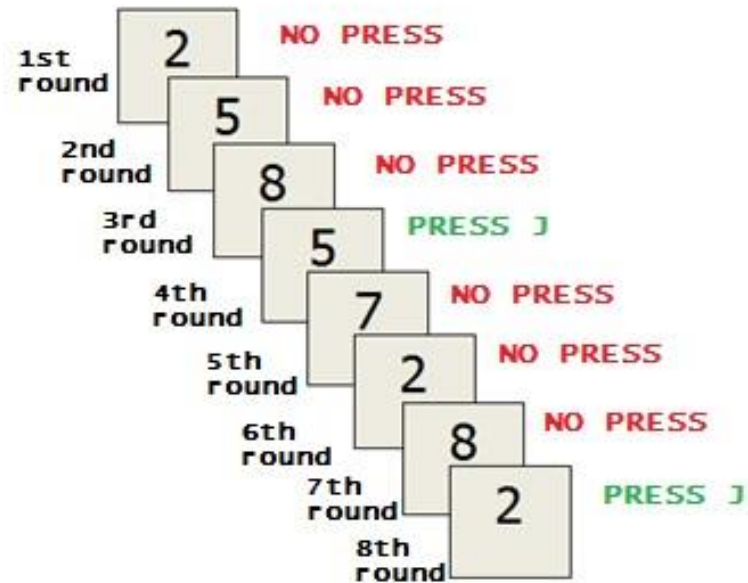
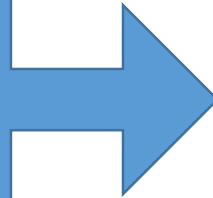
Non-conflict condition



Conflict condition

# Updating skills – 2-back

Numbers appear for 500 msecs followed by a blank page which lasts 2500 msecs



→ N-back examines the performance of executive functions in working memory (attention, updating and inhibition)



### 3. Literacy

- ASER (Basic literacy – [www.asercentre.org](http://www.asercentre.org)):

Letter naming, single word reading, reading of sentences, reading of passages and a couple of comprehension questions.

- Administered in the **school language** and **English**.

Word

ring	sun
ball	
cold	king
clap	foot
fan	
girl	crow

Story

A big tree stood in a garden. It was alone and lonely. One day a bird came and sat on it. The bird held a seed in its beak. It dropped the seed near the tree. A small plant grew there. Soon there was another tree. The big tree was happy.

→ Higher literacy skills: **Narratives** in the school language and/or English (Lina Mukhopadhyay's talk)

# Basic numeracy skills (ASER): Subtraction and Division

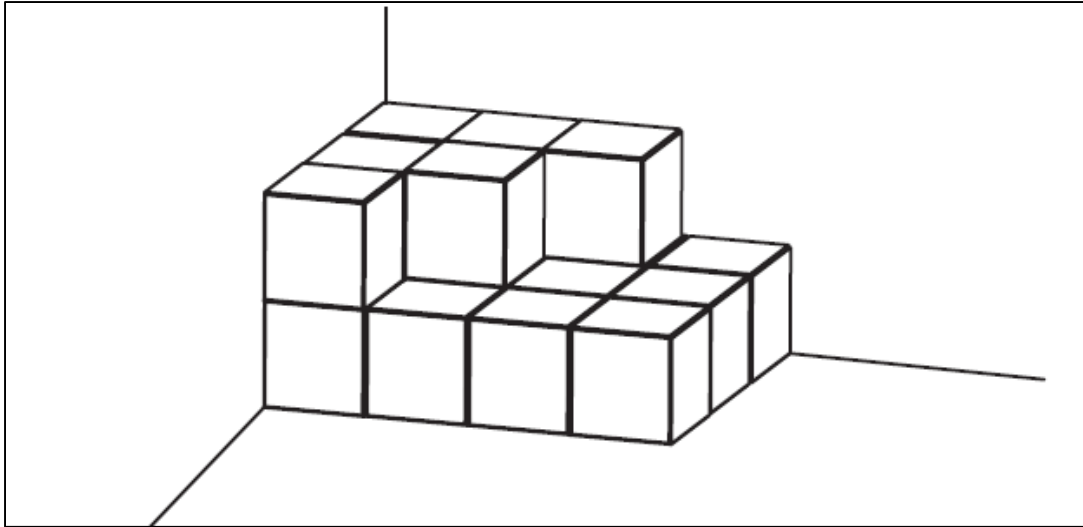


Subtraction	
$\begin{array}{r} 41 \\ - 13 \\ \hline \end{array}$	$\begin{array}{r} 64 \\ - 48 \\ \hline \end{array}$
$\begin{array}{r} 84 \\ - 49 \\ \hline \end{array}$	$\begin{array}{r} 73 \\ - 36 \\ \hline \end{array}$
$\begin{array}{r} 56 \\ - 37 \\ \hline \end{array}$	$\begin{array}{r} 31 \\ - 13 \\ \hline \end{array}$
$\begin{array}{r} 45 \\ - 18 \\ \hline \end{array}$	$\begin{array}{r} 53 \\ - 24 \\ \hline \end{array}$

Division
$7 \overline{) 928}$
$6 \overline{) 769}$
$8 \overline{) 987}$
$4 \overline{) 519}$

- Subtraction and Division tasks have a better discriminant value compared to Addition and Multiplication
- Division is the hardest of all four.

# Mathematical reasoning: Word problems



- Word-problems require good reading comprehension levels (Bjork & Bowyer-Crane, 2012).
- In our dataset, most children asked the experimenter to present the word problem orally in the regional language (Hindi or Telugu)

## Question 1:

Sita stacks the boxes (image 1) in the corner of the room. All boxes are the same size. How many boxes has she used, in total?  
[Please tick/circle]

- |                            |    |
|----------------------------|----|
| <input type="checkbox"/> A | 25 |
| <input type="checkbox"/> B | 19 |
| <input type="checkbox"/> C | 18 |
| <input type="checkbox"/> D | 13 |



# Mathematical reasoning: Meta-maths



## QUESTION 1

Here is how Nita solves two addition problems.

$$\begin{array}{r} 19 \\ +13 \\ \hline 212 \end{array}$$
$$\begin{array}{r} 17 \\ +9 \\ \hline 116 \end{array}$$

Do you think that the problems are solved correctly? If not, why is Nita wrong in her responses?

**Answer:**

- 1 Nita doesn't know how to add numbers
- 2 Nita doesn't know place value and carry forward of values
- 3 Nita was not attentive
- 4 I don't know
- 5 Any other

# Recruitment

- We have completed testing of c. 1000 children (mostly from Delhi and Hyderabad)
- Ongoing analysis of these data
- Data collection in Patna ongoing
- Some **preliminary** findings from Delhi & Hyderabad presented today (this talk and the three talks later on today from each team)



**Participants:** Bi/multilingual Children in Std IV in Delhi schools (Minati Panda's research team)

Groups	Boys	Girls	Total (N=413)
Slum	103	96	199
Non-slum	97	117	214



# Age of Participants

	Slum		Non-Slum	
N= 319	Boys	Girls	Boys	Girls
Mean age (years $\pm$ SD)	8.95 $\pm$ 0.81	8.74 $\pm$ 0.64	8.76 $\pm$ 0.48	8.70 $\pm$ 0.46
Min-Max (years)	8-12	8-11	8-10	8-9

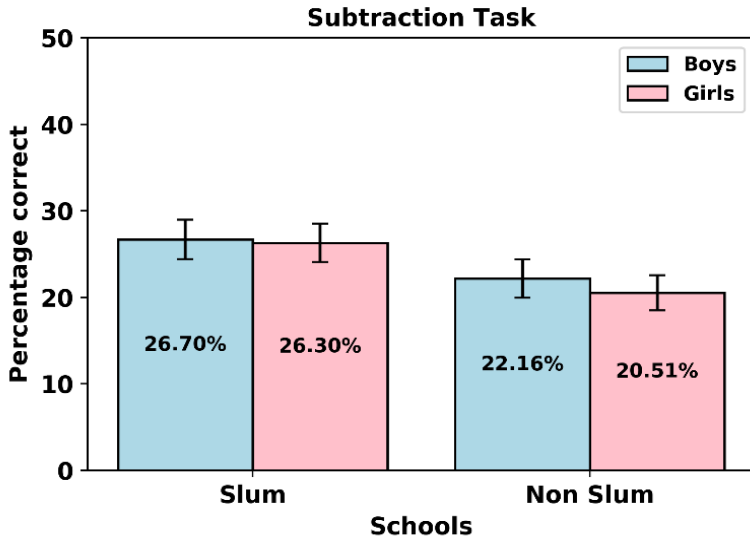
# Variables we need to consider

- School location
- Socioeconomic variables
- First generation learners
- The role of English and Hindi in the classroom (cf. Minati Panda's talk)
- Home language: Hindi vs. Other
- Boys - girls

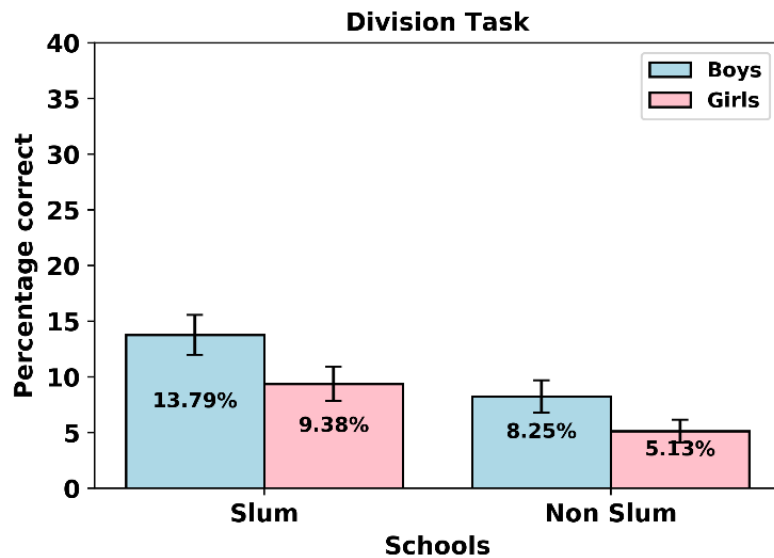
# Very preliminary results

- There is no difference in general intelligence among children (boys – girls, slum vs. non-slum areas).
- Girls perform better than boys in English and Hindi literacy
- Boys perform better than girls in basic numeracy and word-problems
- Children from very deprived areas do not seem to lag behind other children and in some cases they perform better. (e.g. in numeracy and literacy tasks – BUT data from Hyderabad different! (Suvarna Alladi's presentation)).

# Subtraction and Division



Boys perform better than girls

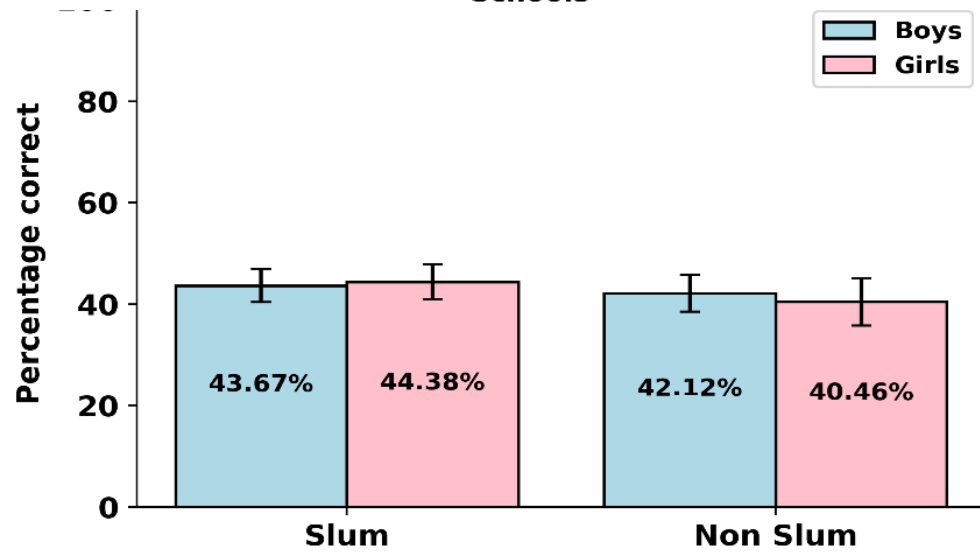
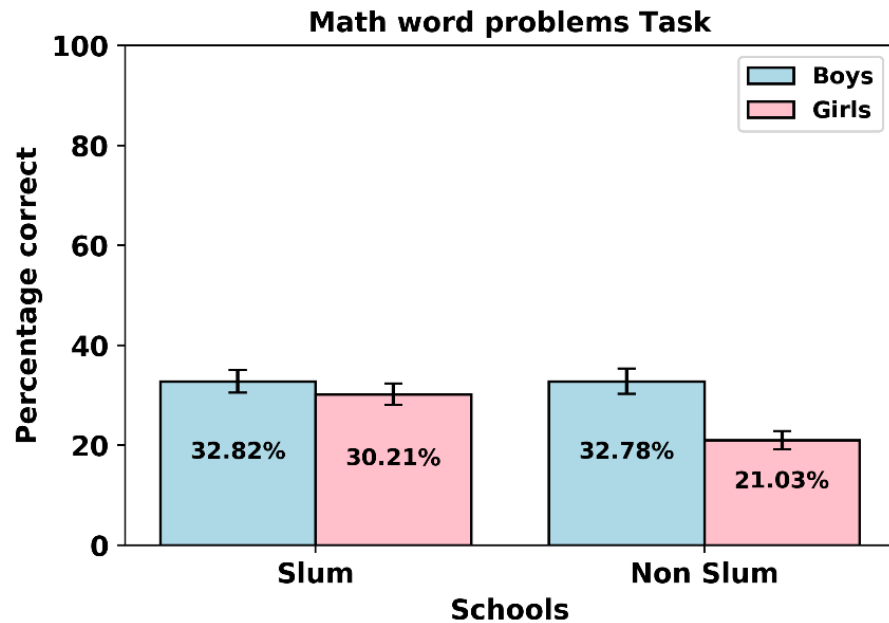


Slum > non-slum

# Mathematical Reasoning skills

Slum > non-slum

Boys better than girls

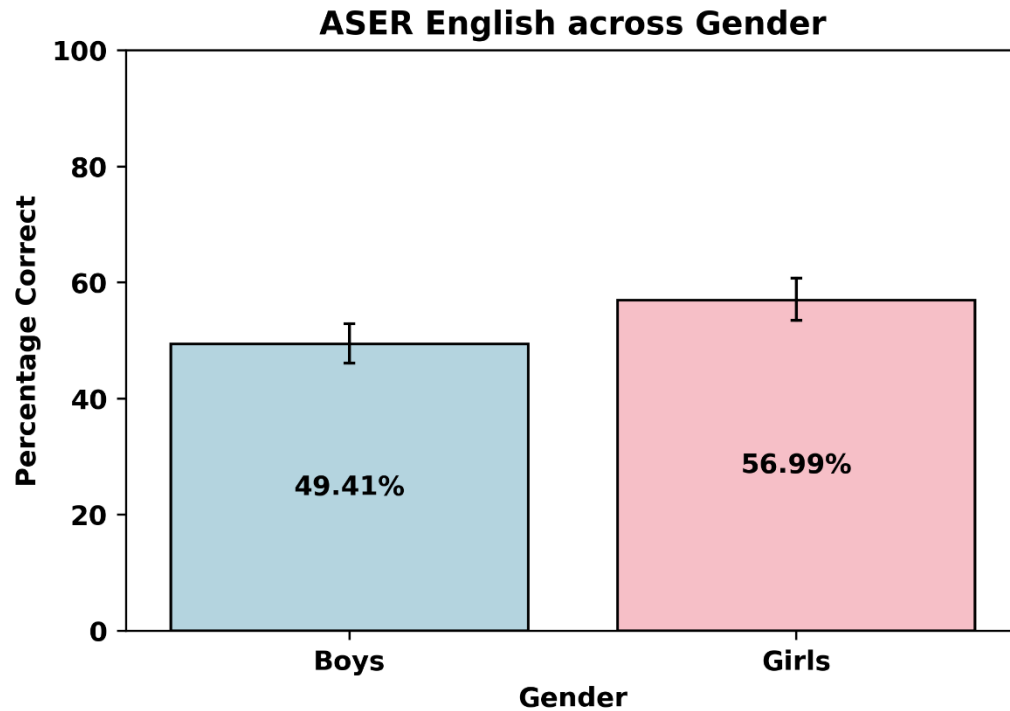


No differences in meta-mathematics



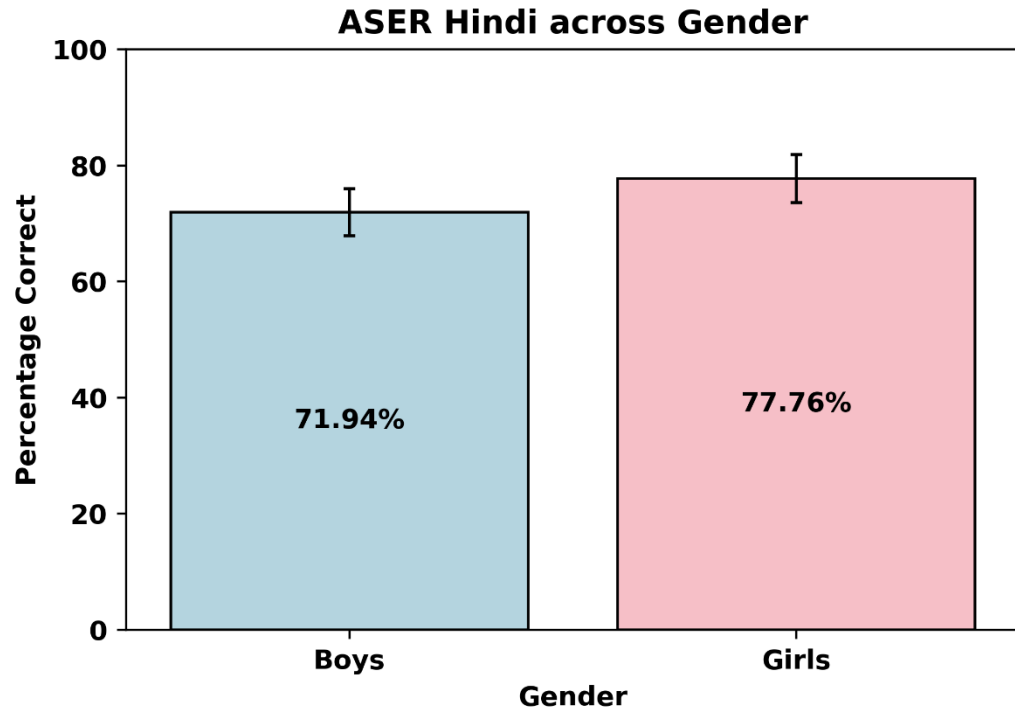
# Basic literacy – English

- Girls outperform boys



- **Main effect of gender:  $F(1,409)=9.79, p=0.002^*$**

# Basic literacy- Hindi



- **Main effect of gender:**  $F(1,409)= 4.49, p=0.03^*$
- **Girls outperform boys**



# Is **literacy** related to numeracy and mathematical reasoning skills? *YES*

Pearson's Correlations	ASER Literacy (Hindi)	ASER Literacy (English)
Word problems	0.32**	0.32**
Metamaths	0.41**	0.44**

\*\* (p<0.001)



- Is general intelligence and other cognitive skills related to literacy and mathematical abilities? *YES*

Pearson's Correlations	ASER Literacy (Hindi)	ASER Literacy (English)
Raven's	0.37**	0.40**
2-back	0.28**	0.23**

\*\* (p<0.001)

Pearson's Correlations	Math word problems	Metamaths
Raven's	0.29**	0.20**
2-back	0.16**	0.25**

\*\* (p<0.001)

# Many open questions

- Children from very deprived areas do not seem to underperform compared to the other children.
- In certain school skills children from slums outperform the others.
- Why?
- Gender differences

# Children in Disadvantaged Low-income settlements

- What is the role of **life experience** in children living in challenging contexts?

The opportunity to engage with quantity assessments and relating these quantities to money or to other quantities is higher among children from poor families as parents often require children's support for handling everyday activities including buying and selling in markets

(cf. Stillman & Galbraith, 1998; Schoenfeld, 1996)

- The urban poor may have an added advantage of dealing with quantity phenomena, the relationships and patterns in multilingual and multi-communicative contexts because of frequent migration of people from different parts of the country to slum areas.

→ Would this predict better problem-solving skills for children in these areas?



# Open questions



- Children in challenging educational contexts:

Could **life experience** compensate for severe deprivation?

How can we measure life experience?

Can life skills be brought in the classroom ?

Can life skills provide good examples of experiential learning and building on it?

- **Other factors** (not considered yet):
- Low school attendance rates (child and teacher);
- Bridging life and school skills? (in materials or method of teaching)
- Distance between language of instruction and oral language (bookish Hindi and spoken Hindi)
- Distance between language of instruction and home language (Hindi / Bhojpuri)
- Noise



# Thanks

- to all the schools (principals, teachers and children) who took part in the project and are willing to continue!
- 
- SCERT (State Council for Education Research and Training)
  - Education Ministries in Delhi, Hyderabad and Patna
  - British Council India for their superb support!

and

*YOU for your attention!*

