

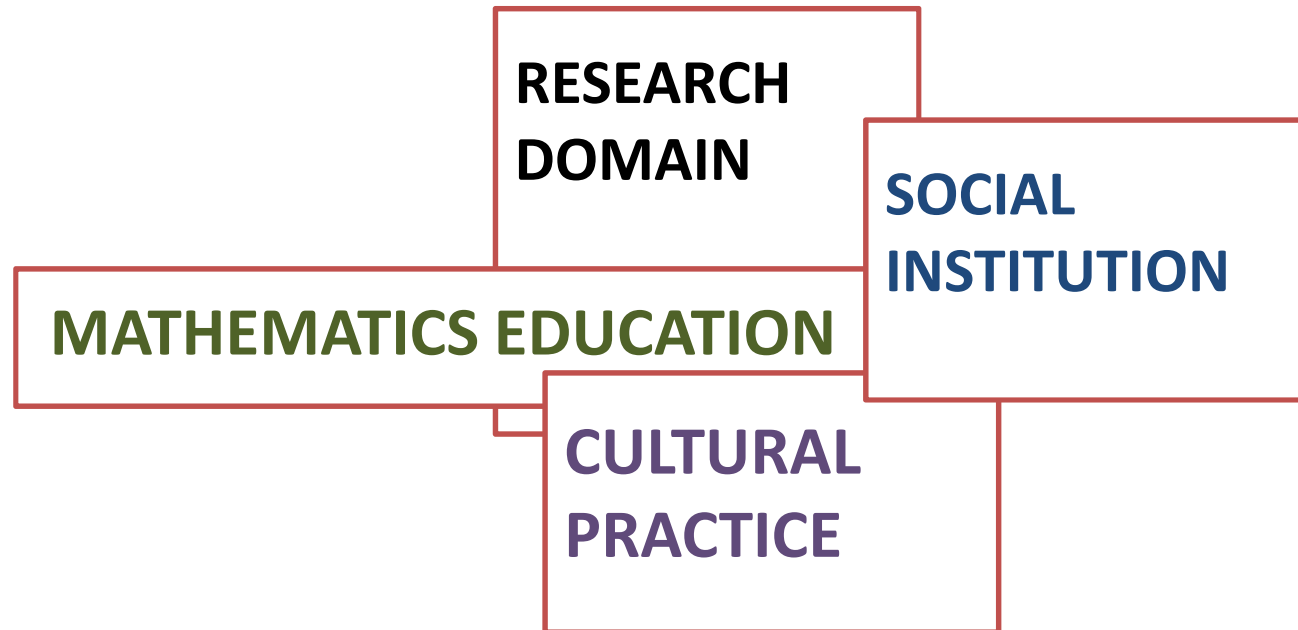
# NEW INSIGHTS IN THE USE OF LANGUAGE IN MATHEMATICS EDUCATION

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Trondheim, November 2017



**Matematikksenteret**  
Nasjonalt senter for matematikk i opplæringen

# What is mathematics education?



THIS NETWORK OF OVERLAPS GIVES **MEANING** TO MATH EDUCATION

# What is language?

**LANGUAGE (USE)**

**SOCIAL  
LANGUAGES**

**LANGUAGE  
SYSTEMS**

**SYSTEMS  
OF LANGUAGE**

THIS NETWORK OF OVERLAPS IS WHAT GIVES **MEANING** TO LANGUAGE

# My argument

## MATHEMATICS CLASSROOM

LANGUAGE  
OF THE  
LEARNER

LANGUAGE OF  
THE TEACHER

LANGUAGE OF  
MATHEMATICS

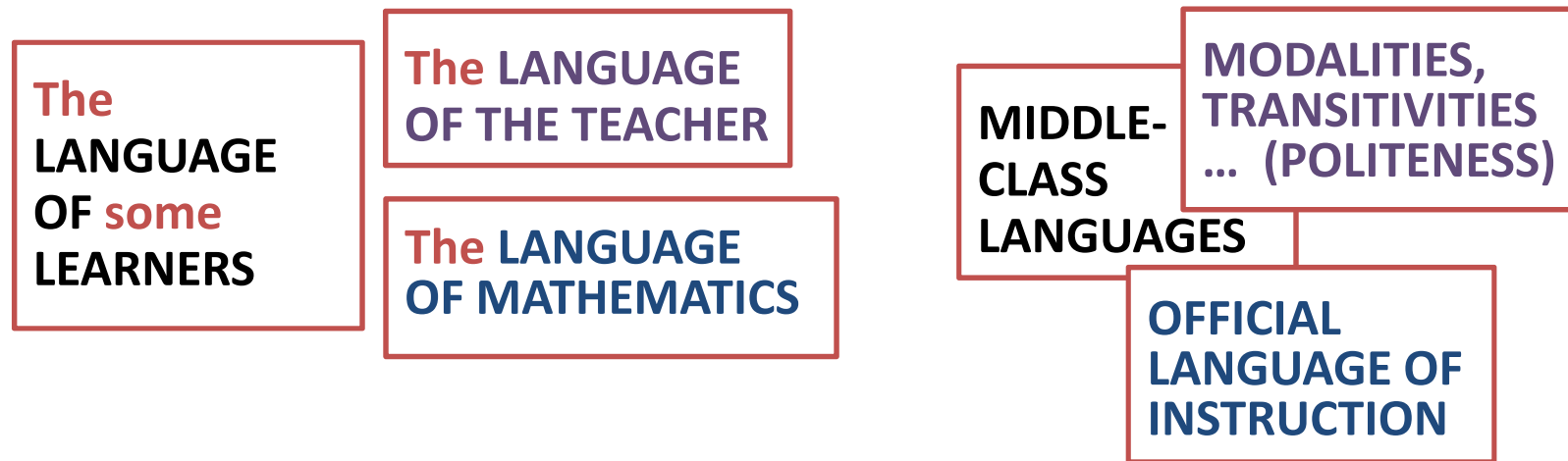
SOCIAL  
LANGUAGES

LANGUAGE  
SYSTEMS

SYSTEMS  
OF LANGUAGE

Language is a **resource** for the creation of mathematical meanings in the midst of the communication of social and personal relationships as well as experiences of the world through a diversity of languages.

# Situating the argument



Language is a **resource** for the creation of mathematical meanings in the midst of the communication of social and personal relationships as well as experiences of the world through a diversity of languages.

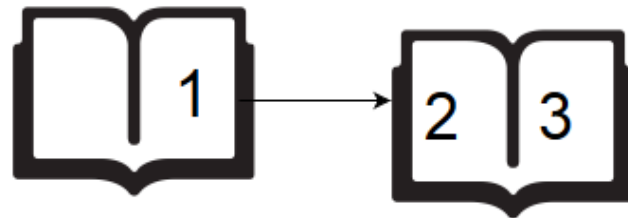
BUT... Which of these mathematical meanings can be taken as **shared** and hence as evidence of mathematics learning?

# A context of culture

*En un llibre de vuitanta-nou pàgines, els nombres de pàgines s'han imprès malament. Cada tres pàgines, s'ha oblidat un nombre, pel que la numeració ha quedat **1, 2, 4, 5, 7, 8...** i així. Quin nombre hi ha imprès a la darrera pàgina?*



A book has 89 pages, but the page numbers are printed incorrectly. Every third page number has been omitted, so that the pages are numbered **1, 2, 4, 5, 7, 8...** and so on. What is the number on the last printed page?

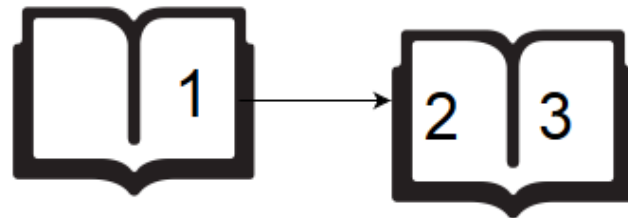


# A context of culture

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# Two instances of language

Maria: *U i dos, quatre i cinc, set i vuit, deu i onze... fins cent trenta-tres* [One and two, four and five, seven and eight, ten and eleven... up to one hundred and thirty-three.]

Leo: *¡Muy largo!* [Very long!]

Maria: *Cap problema, no son mil pàgines.* [No worries, it is not one thousand pages.]

Leo: *Agafem les pàgines que falten.* [We take the missing pages.]

Maria: [On the worksheet, “ochenta-y-nueve”, number word for 89.] *Què és això? Uf! Fatal! Has preguntat a l’Ada, oi?* [What is this? Ugh! Pretty bad! You asked Ada, eh?]

Ton: *Què més et dóna? El problema és el que importa.* [Why do you care? The problem is what matters.]

Ada: *¿Cuáles números son como ochenta y nueve?* [Which numbers are like eighty-nine?]

Ton: *Dieu cuáles números, eh?* [You say which numbers, eh?]

Ada: *Diem cuáles son como ochenta y nueve. Cuáles son como. No vull dir cuáles son ni cuántos son. No más ejemplos, porfa.* [We say which are like eighty-nine. Which are like. I do not mean which are or how many are. No more examples, please.]



# Tensions regarding language

Maria: *U i dos, quatre i cinc, set i vuit, deu i onze... fins cent trenta-tres* [One and two, four and five, seven and eight, ten and eleven... up to one hundred and thirty-three.]  
Leo: *¡Muy largo!* [Very long!]  
Maria: *Cap problema, no son mil pàgines.* [No worries, it is not one thousand pages.]  
Leo: *Agafem les pàgines que falten.* [We take the missing pages.]  
Maria: [On the worksheet, “ochenta-y-nueve”, number word for 89.] *Què és això? Uff! Fatal! Has preguntat a l'Ada, oi?* [What is this? Ugh! Pretty bad! You asked Ada, eh?]  
Ton: *Què més et dóna? El problema és el que importa.* [What matters.]

## The language of Leo

Exclamative and interrogative modes together with interjections, “What is this? Ugh! Pretty bad!” produces the meaning of something wrongly written on the worksheet.

Ada: *¿Cuáles números son como ochenta y nueve?* [Which numbers are like eighty-nine?]  
Ton: *Dieu cuáles números, eh?* [You say which numbers, eh?]  
Ada: *Diem cuáles son como ochenta y nueve. Cuáles son como. No vull dir cuáles son ni cuántos son. No más ejemplos, porfa.* [We say which are like eighty-nine. Which are like. I do not mean which are or how many are. No more examples, please.]

## The language of Ada

Interjections and intonations, “You say which numbers, eh?” produces the meaning of the word “cuáles”, which stands for “which”, as heterodoxically used by a plural “you” voice.

# Language as resource?

## MATHEMATICS GROUP WORK

LANGUAGES OF  
THE LEARNERS

LANGUAGE  
SYSTEMS

SOCIAL LANGUAGES

### Translanguaging

Despite of the language-in-education policy and the prevailing language of school mathematics, learners fluidly use all their languages, to both communicate tensions and overcome them in the process of discussing the factorization of 88 and then 89.

Language is a **resource** for the creation of mathematical meanings in the midst of the communication of social and personal relationships as well as experiences of the world through a diversity of languages.

# Language as resource?

## MATHEMATICS GROUP WORK

LANGUAGES OF  
THE LEARNERS

SYSTEMS OF  
LANGUAGE

### Grammar features

SOCIAL LANGUAGES

Imperfective present tense together with material, mental and existential processes communicate a focus on exposition and discussion of thinking processes (“we take the missing pages”), but also the presence of these features in response to behavioral processes (“why do you care?”).

Language is a **resource** for the creation of mathematical meanings in the midst of the communication of social and personal relationships as well as experiences of the world through a diversity of languages.

# Concluding the argument

Language functions in several directions, e.g.:

- It contributes to the realization of normative meanings in school mathematics along with discourses of language accuracy
- It enables learners to influence the process from potential to actual meaning through their knowledge of diverse languages

Language is a **resource** for the creation of mathematical meanings in the midst of the communication of social and personal relationships as well as experiences of the world through a diversity of languages.

BUT... participants must be active in the use of their languages to produce and share mathematical meanings that can be taken as math learning.

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