

Berren guri Sami gahwiligu wunjayi yura  
Ngari guri Quandamookajarajen  
Ngari Nunagal, Goenbal, Ngugi  
Ngali yuluburriba  
Ngari yura gahwiligu nguru mugia ngandu wanangga djina-jara  
wulara gagum Sapmi

# Indigmecc 2

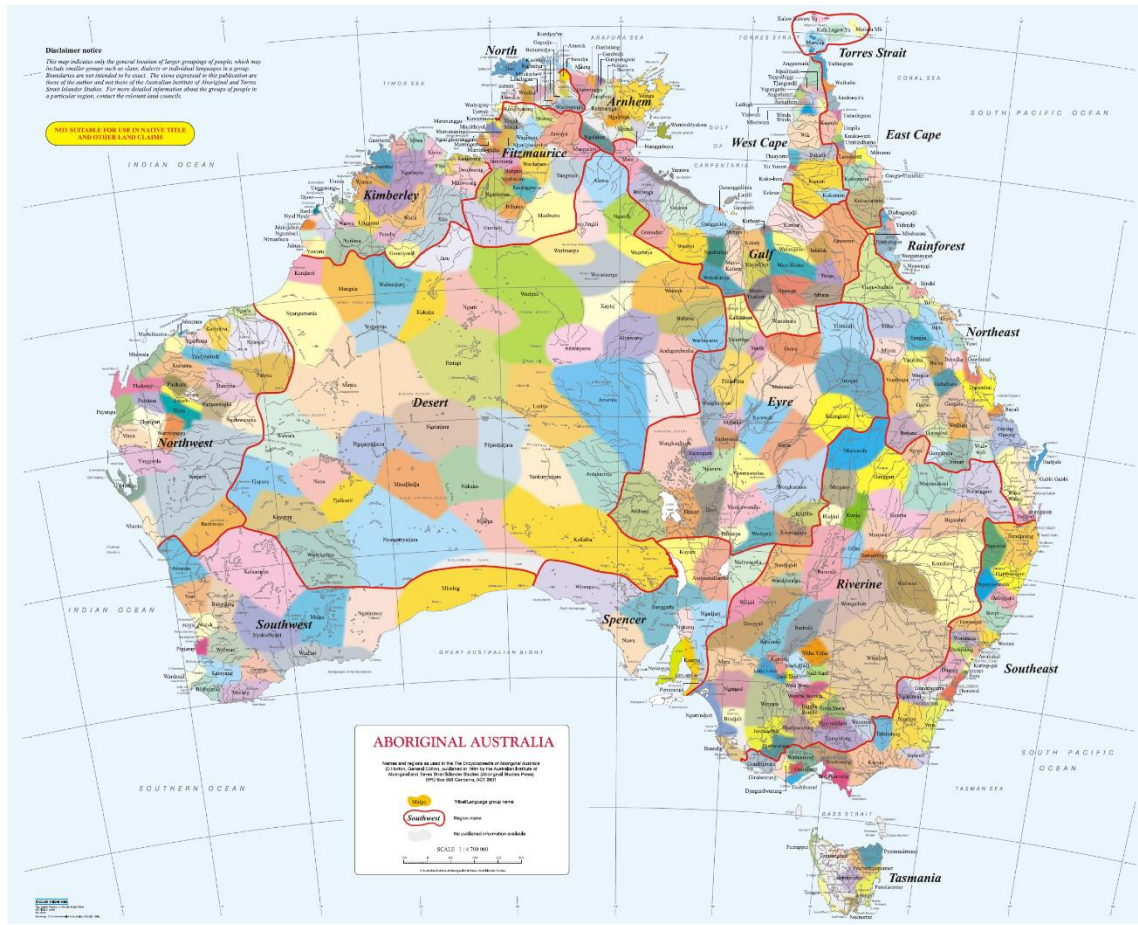


## Does Indigenous Mathematics Matter?

Prof. Chris Matthews

Quandamooka Nation

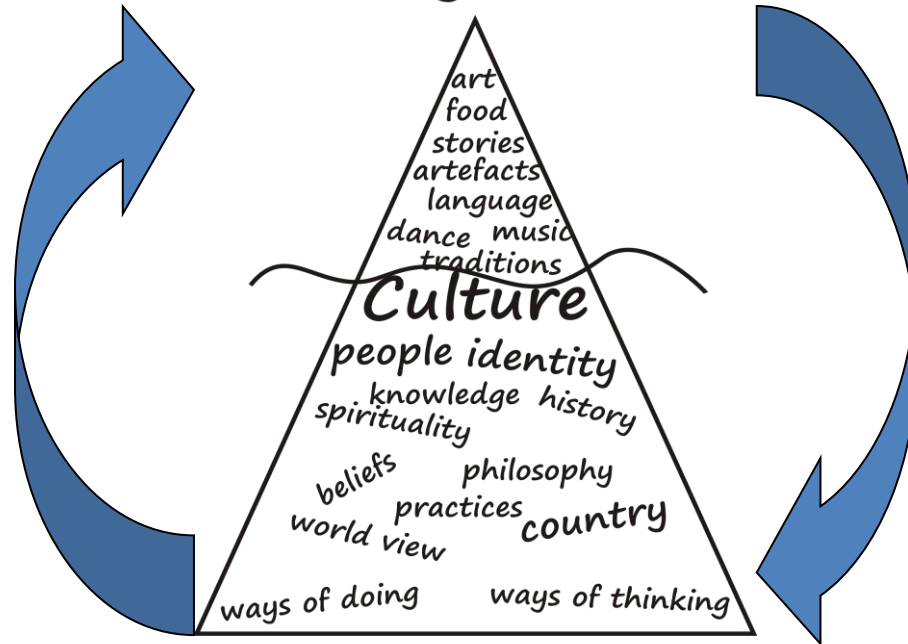
1. CEO, Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA)
2. Associate Dean (Indigenous Leadership and Engagement), Science Faculty, University Technology of Sydney (UTS)



# What is Culture?



## Iceberg Model



# Terra Nullius



**Our Shared History**

**Our Relationship**

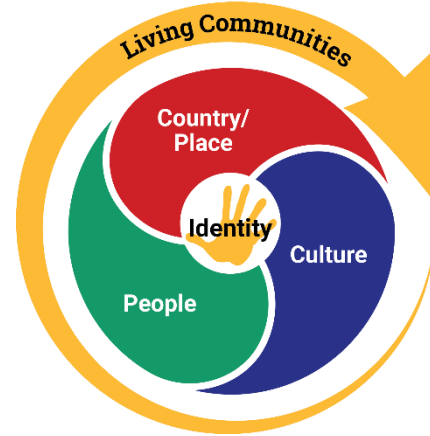


# Education Political/Policy Landscape



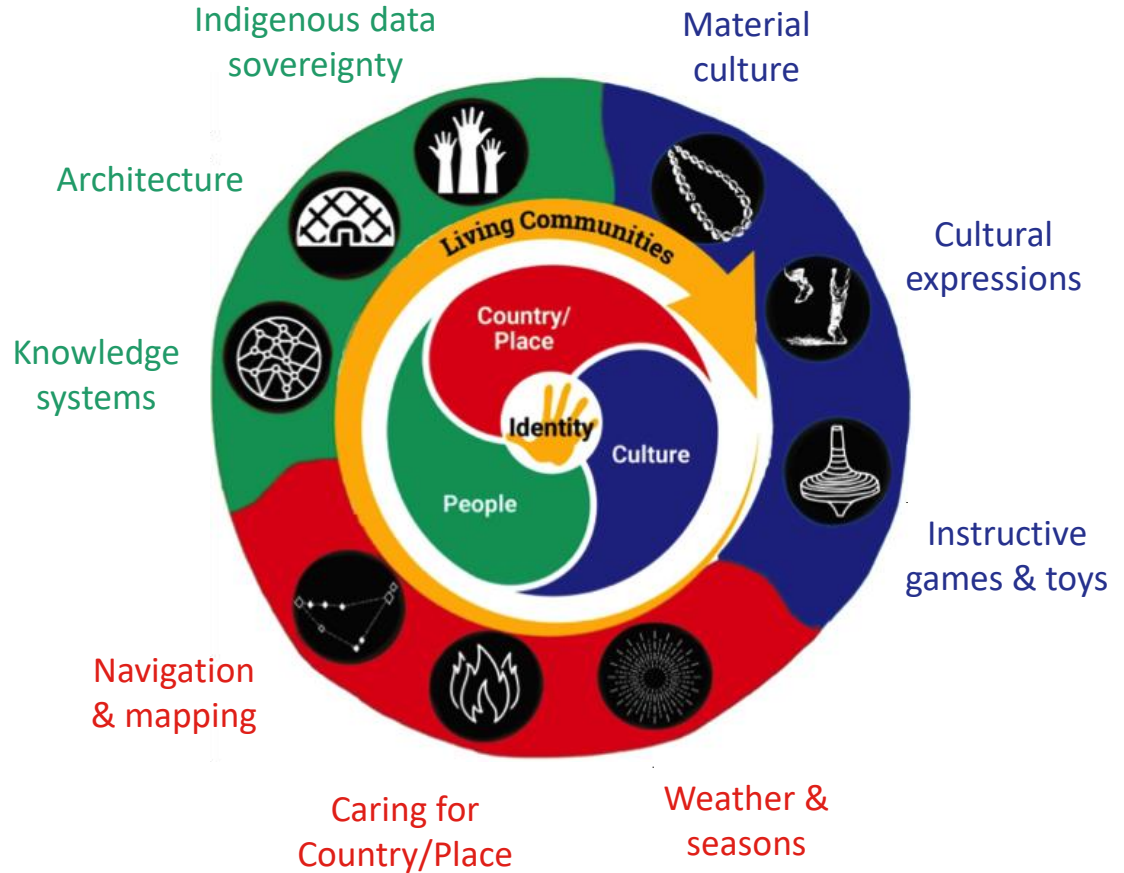
- Lack of Progress on the Close the Gap (CTG)
- Productivity Commission Report that reviewed the CTG initiative highlights lack of innovation i.e. rebadged “business-as-usual” projects.
  - Large investments (30 million +) a sporting program to improve Indigenous education
- National Curriculum in Mathematics now includes the Aboriginal and Torres Strait Islander Histories and Cultures Cross Curriculum Priority (CCP)
  - The CCP are included through the elaborations which is not mandatory

Aboriginal &  
Torres Strait  
Islander  
Histories &  
Cultures in the  
Australian  
Curriculum:  
Mathematics



# Aboriginal & Torres Strait Islander Histories & Cultures in the Australian Curriculum: Mathematics

Rich  
Contexts





# Rich Contexts

## Material culture | Shell necklaces



Shell necklace by Dulcie Greeno (b.1923). Stripy buttons, marina and rices hells. Launceston 2016. Purchased by TMAG Foundation. Image: Tasmanian Museum and Art Gallery.



Necklace by Aunty Dulcie Greeno,  
<https://www.nma.gov.au/explore/collection/highlights/tasmanian-aboriginal-shell-necklaces>

recognise, continue and create repeating patterns with numbers, symbols, shapes and objects, identifying the repeating unit

AC9M1A02

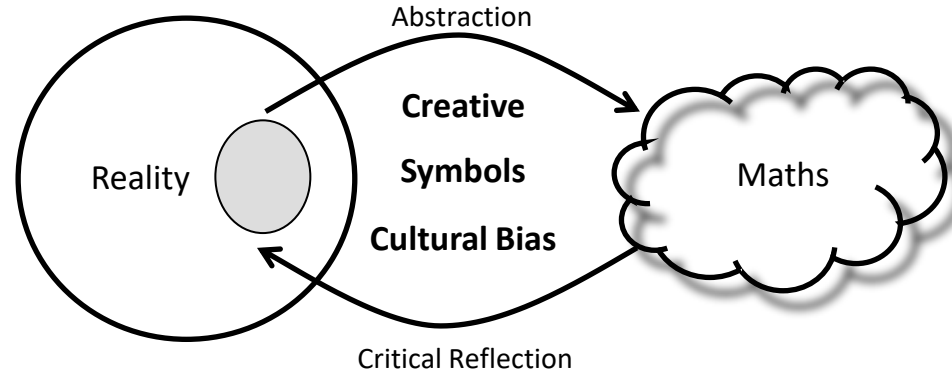
➤ *considering how the making of shell or seed necklaces by First Nations Australians includes practices such as sorting shells and beads based on colour, size and shape, and creating a repeating pattern sequence*

# STEM Political/Policy Landscape

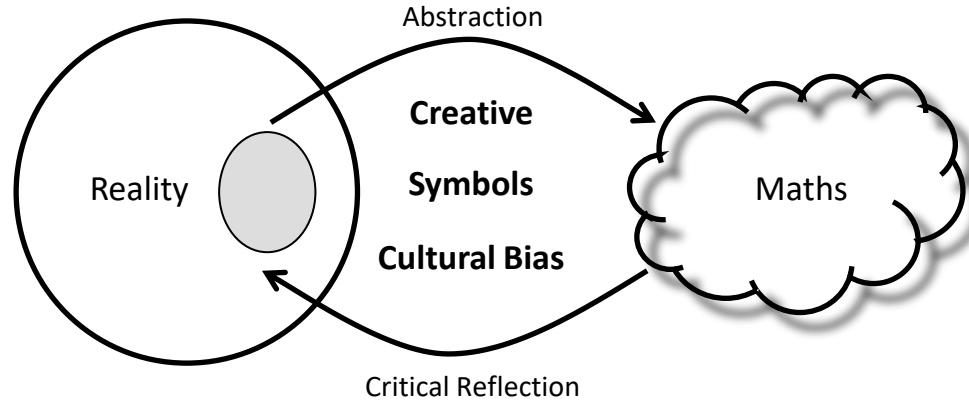


- Board Member of Science Technology Australia (STA)
  - 140 member organisations and 225,000 scientist, engineers and technologists.
  - Strategic Direction of STA
  - I have input into many National agendas
- Science Priorities and the Science Statement by the Office of the Chief Scientist and the Federal Minister for Industry and Science
  - First Nation priority
  - First Nation initiatives will also be included in all other Science Priorities
  - Elevate and Invest in First Nations perspective of STEM

# What is Mathematics?



# Goompi Model: Keeping Connections



# Patterns: Linear Equations

---

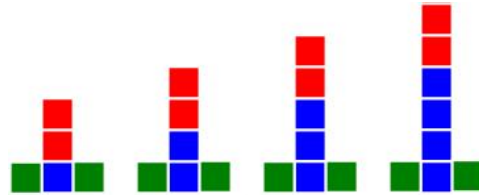


General form of a linear equation

$$y = mx + c$$

where  $y$  is the dependent variable,  $x$  is the independent variable and  $m$  and  $c$  are constants

# Patterns: Linear Equations

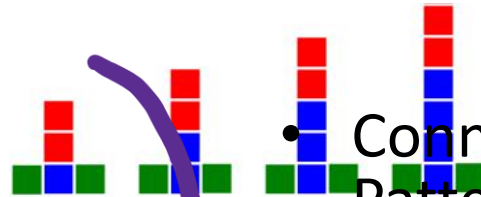


Number Sequence

Linear Equation

$$(y = x + 5)$$

# Patterns: Linear Equations

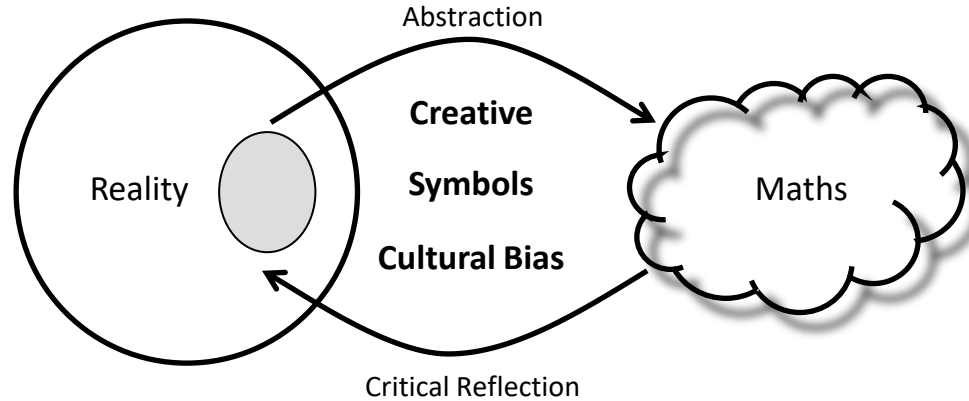


- Connecting the Structure of Pattern and Equation
- Numbers emphasize the Structure
- Connecting the Symbolism

Linear Equation

$$(y = x + 5)$$

# Goompi Model: Keeping Connections





# PD Session, Perth

3 → *hard a little*  
*but I got it now*

15

Maths is easy!

0 1 2 3 4 5

0 1 2 3 4 5

middle

middle

5 → + 3

5 → + 4

0 1 2 3

middle ← *easy* *maths*

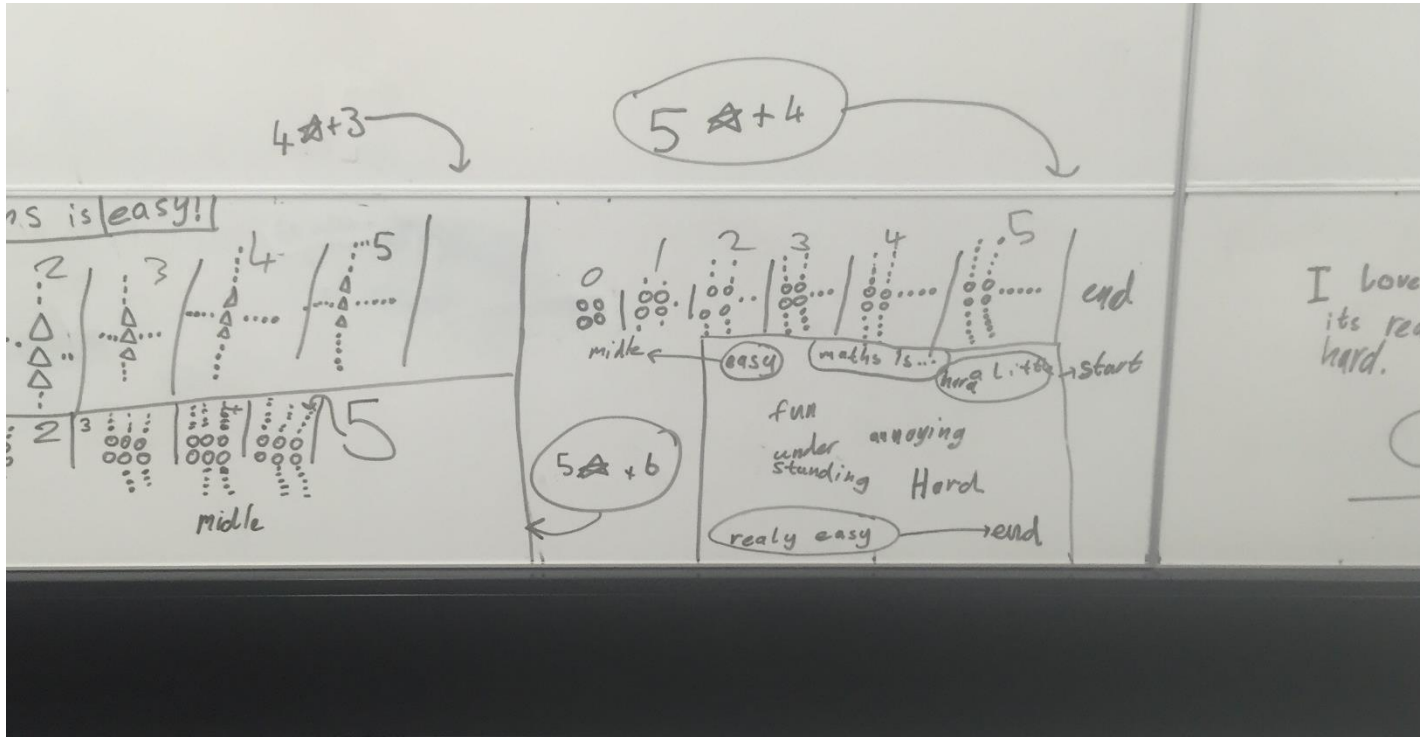
fun  
under  
standing

← *really easy*

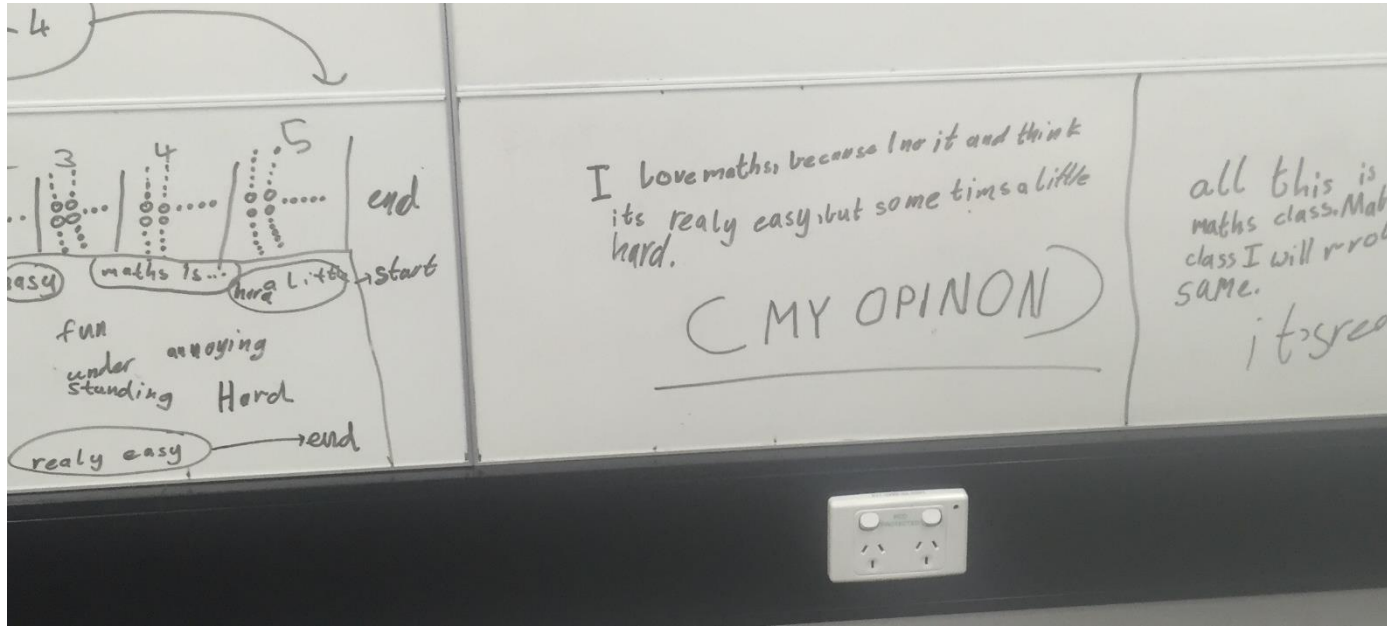
5 → + b

Secondary

# PD Session, Perth




# PD Session, Perth



# Students' expressions ...

Residents of Orphanage

Caregivers



(+ 5 orphans per year)

Year	Same: 2	Grow:
1 <sup>st</sup> year	2	5
2 <sup>nd</sup> year	2	10
3 <sup>rd</sup> year	2	15
4 <sup>th</sup> year	2	20
5 <sup>th</sup> year	2	25

Detailed description of the student work: The work is on a blue background divided into six panels. The top-left panel shows two caregivers (a boy and a girl) and notes that 5 orphans are added each year. The other five panels show the progression from the 1st to the 5th year. Each year's panel includes a drawing of the two caregivers and a set of small circles representing orphans. The number of orphans increases by 5 each year, while the number of caregivers remains constant at 2. The text 'Same: 2' and 'Grow: [number]' is written below each year's drawing.

# Elders Wisdom



---

***Pattern thinking is Aboriginal thinking. There is no big boss. Patterns are about belonging. Nothing is separate from anything else***

David Mowaljarlai, Elder from Derby

# ATSIMA 2023 Conference: Yirrkala Community



Yingia Guluya MLA – Member for  
Muluka, NT Parliament

Challenged us to:

“Come closer to Yolngu way of  
seeing and being in the world”



# A Vision: Garma Living Maths

---



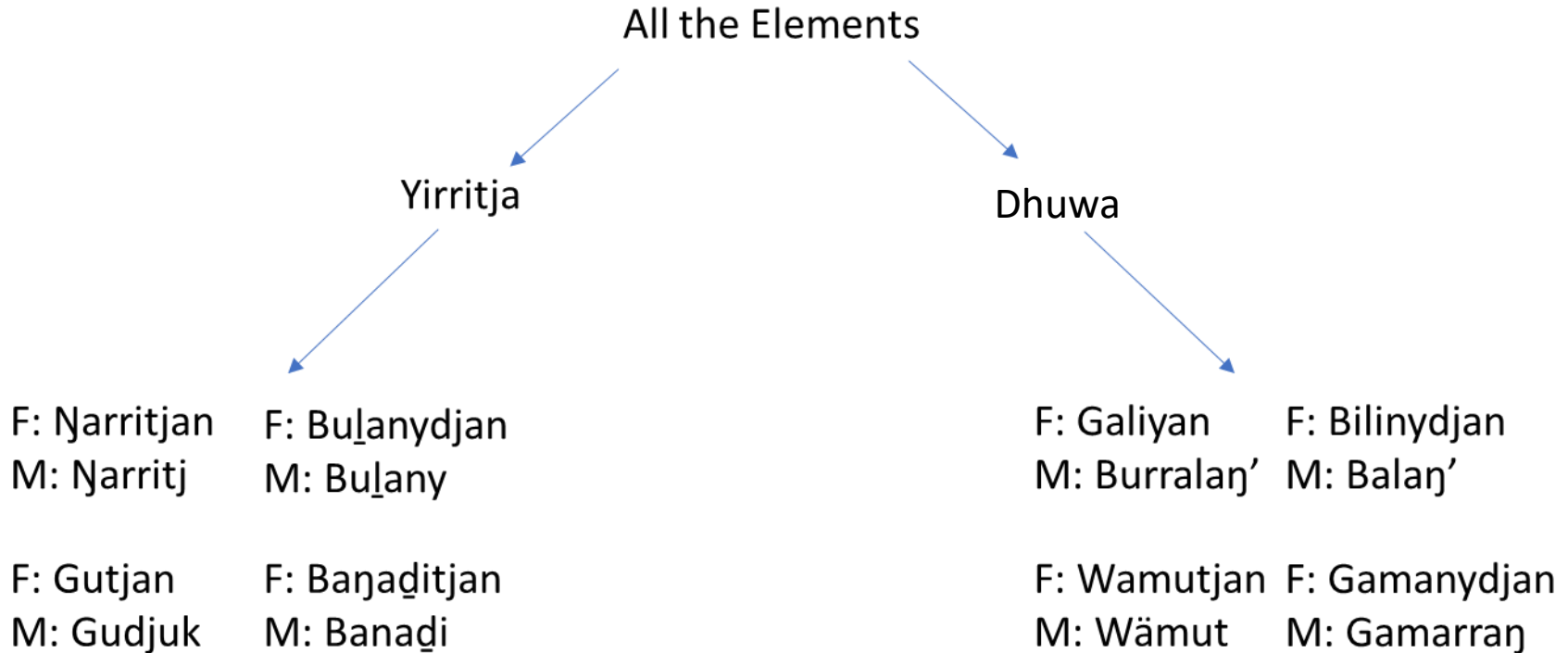
*Our mathematics, Yolŋu mathematics, is Gurrutu.*

Dr M. Yunupingu,

1<sup>st</sup> Yolngu Principal of Yirrkala Community School

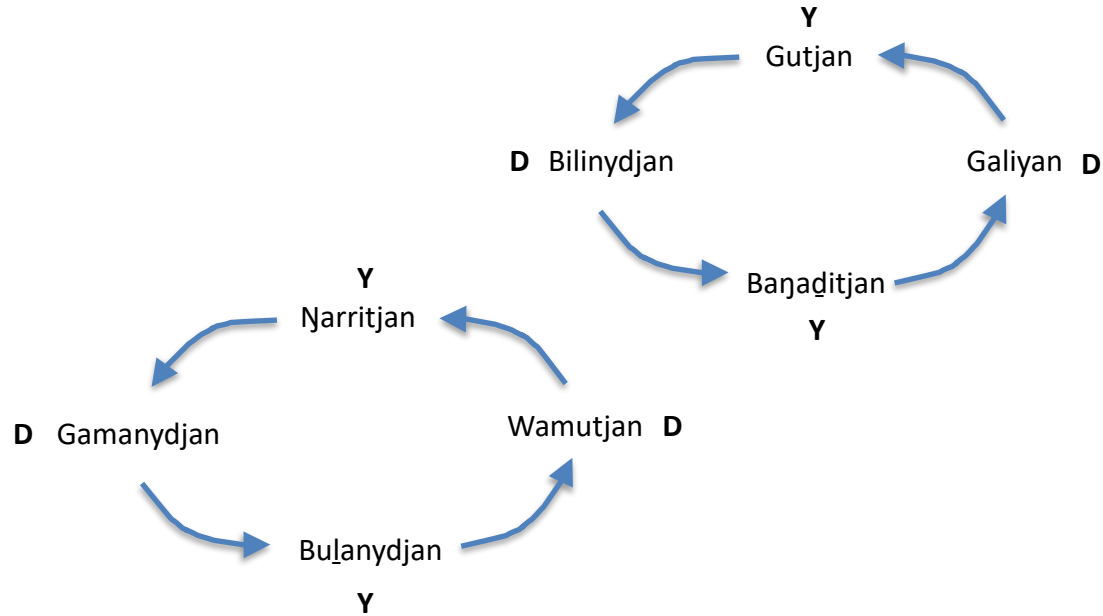
Leader singer of Yothu Yindi

# Gurrutu: Kinship to all elements

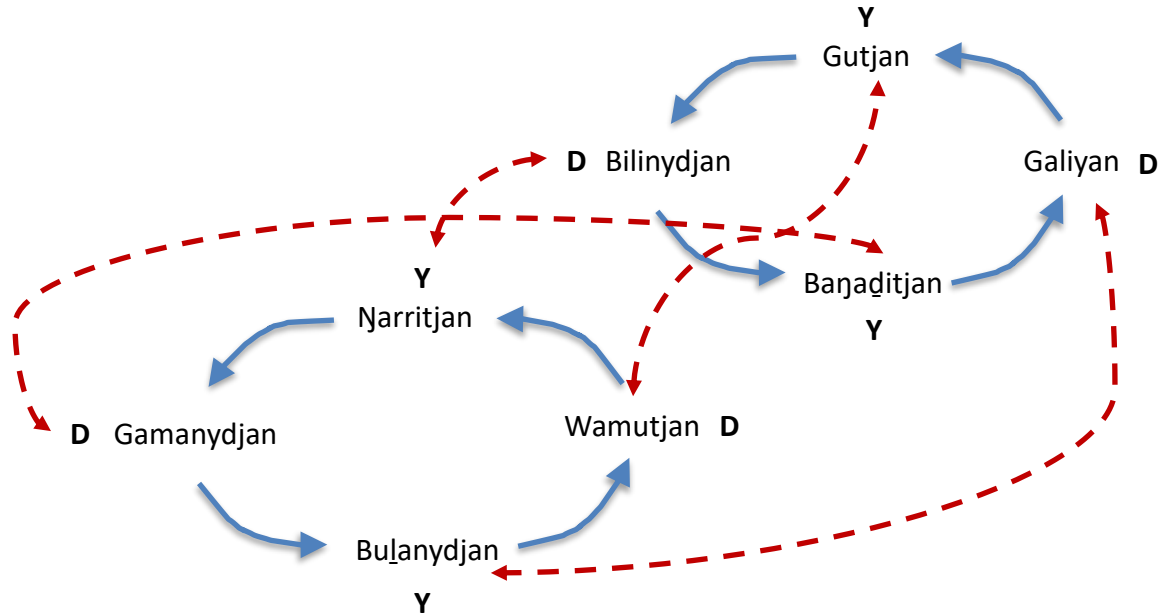




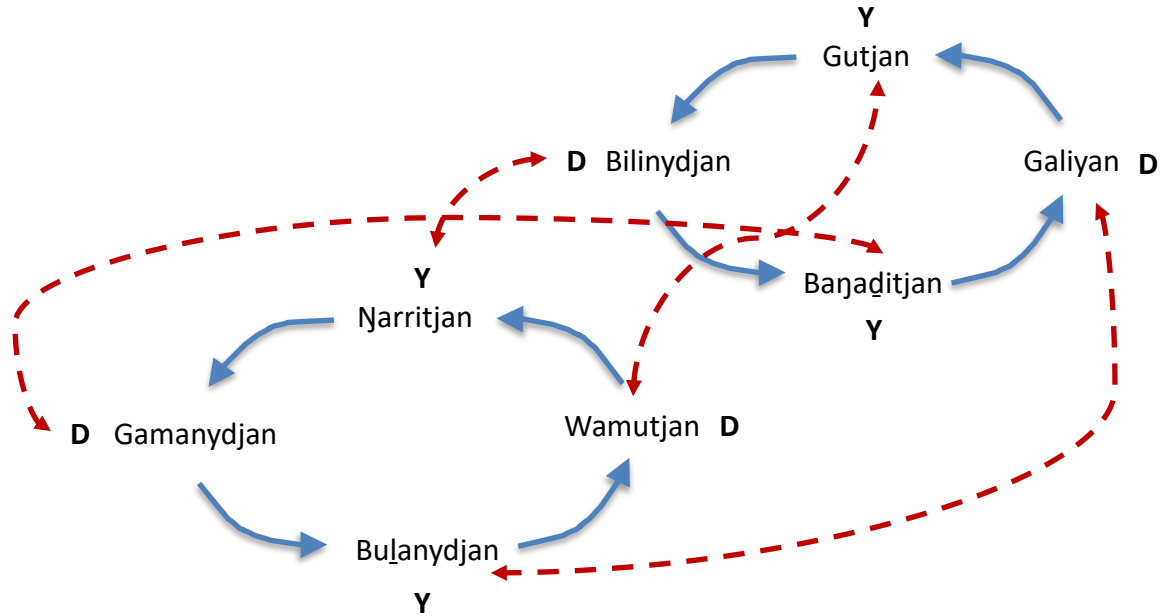
# Malk: Skin Groups Cycles: Yothu Yindi



# Malk: Skin Groups Cycles: Yothu Yindi



# Malk: Skin Groups Cycles: Yothu Yindi



Gurrutu  $\xleftrightarrow{\text{Connection}}$  Maths

Yirritja  
Dhuwa ] Balance

Law  $\leftrightarrow$  All Elements

People carry  
their moiety

+  
- ] Balance

Law  $\leftrightarrow$  All Elements

Numbers carry  
their moiety

# Adding positive and negative numbers

Dhuwa  $\rightarrow +$   
Yiritja  $\rightarrow -$

$$+7 + +2 = +9$$

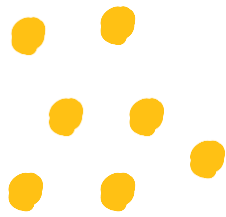
$$-6 + -5 = -11$$

$$-7 + +3 = ?$$

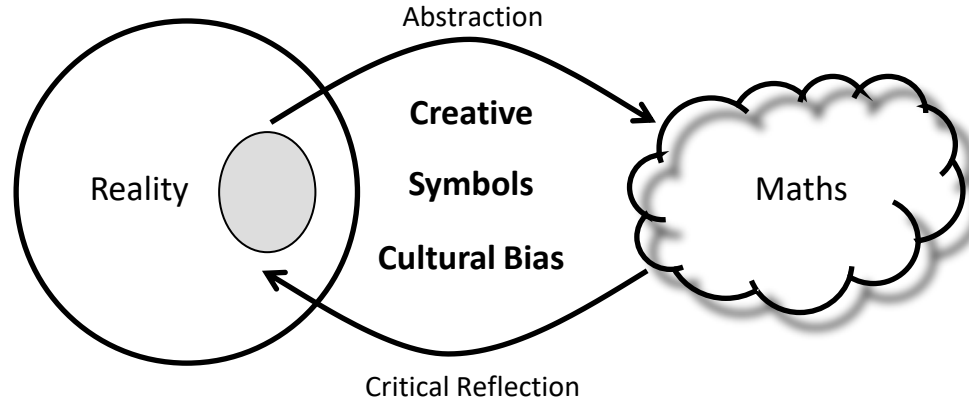
Rrambanyi

# Rrambani

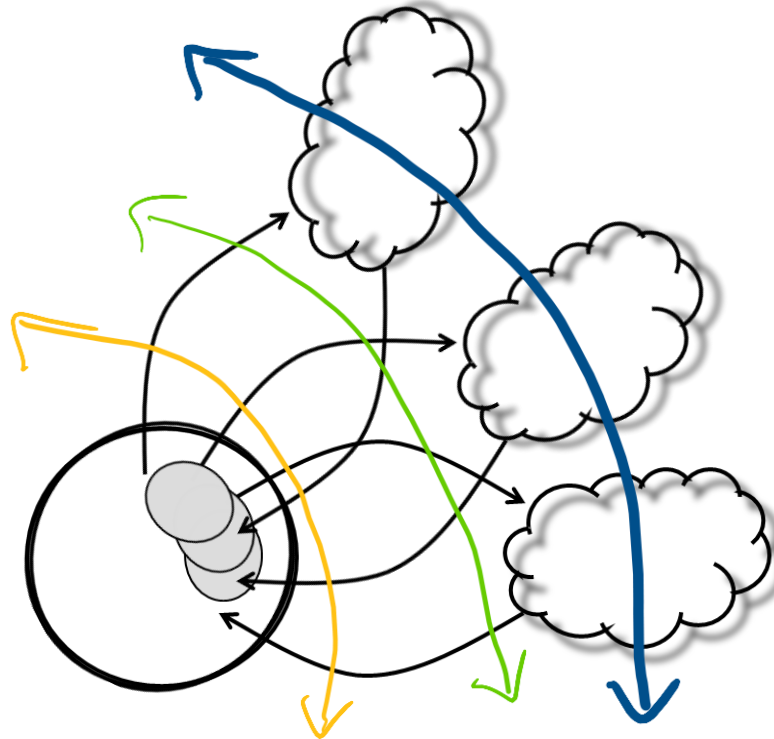
$$-7 + +3 = -4$$



# Goompi Model: Keeping Connections

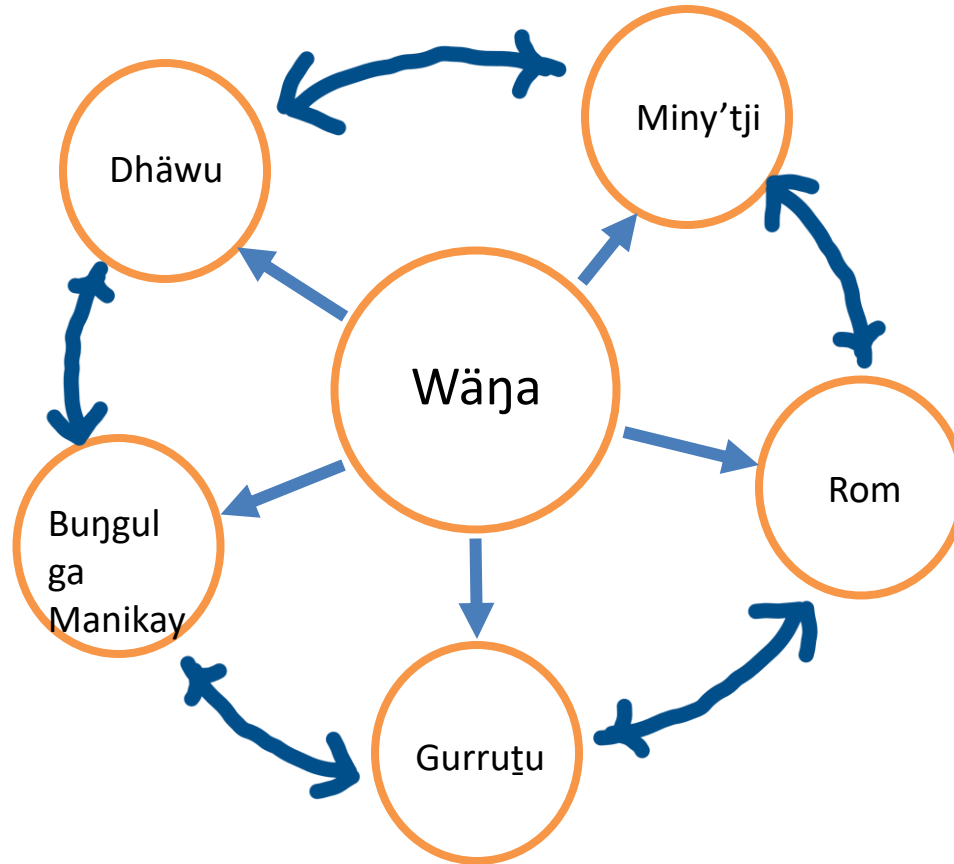


# Goompi Model: Keeping Connections





# Garma Living Maths: Moving through



# Conceptual Framework: Curriculum

