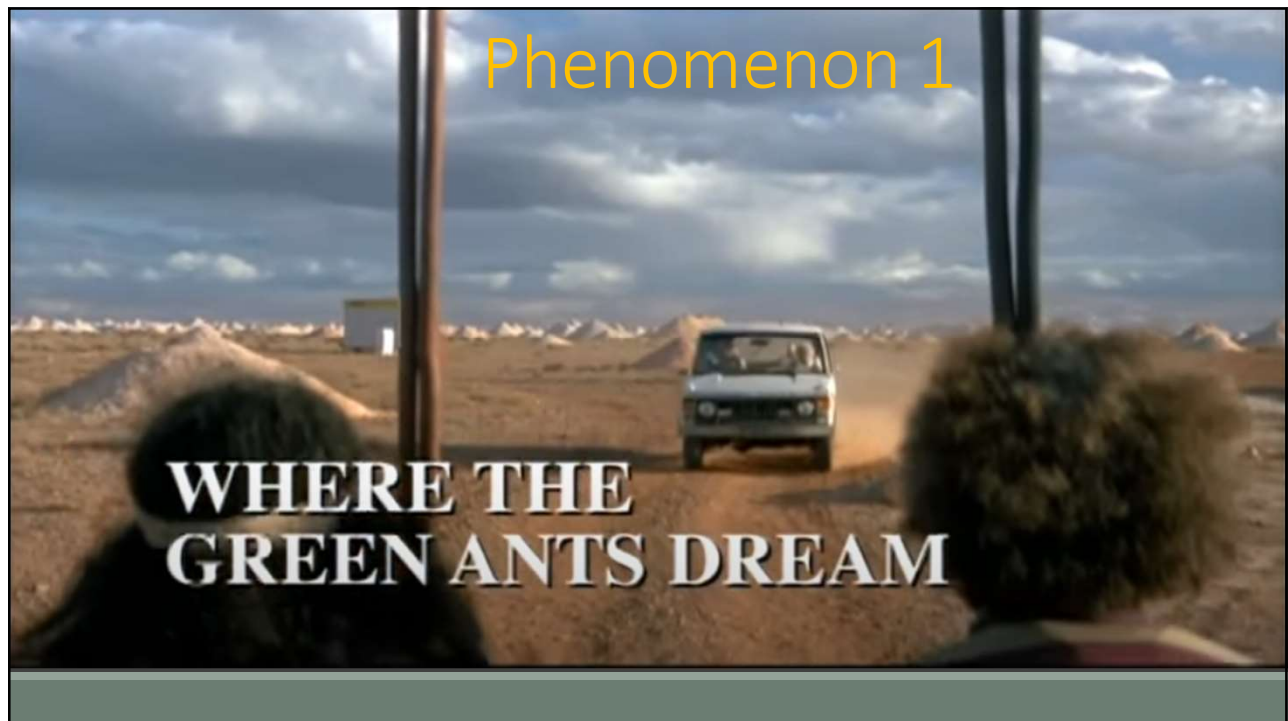


1



2

## Ethnomathematics compels us to... Gelsa Knijnik

analyze the effects of truth produced by the discourses of academic mathematics and school mathematics;

consider the centrality of culture and the power relations that institute mathematics education;

problematize the dichotomy between “high” culture and “low” culture in mathematics education;

3

## Indigenous education Edward Doolittle

In a traditional Indigenous education, people are encouraged to develop their own sophisticated, personal responses to situations and natural phenomena.

[These] ways of understanding may actually be supplanted by mathematics education, which is not just mere knowledge, but a Trojan horse full of Greek philosophers wielding Logos.

4



5

## Post-truth Vittorio Bufacchi

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a deliberate strategy aimed at creating an environment where...

- objective facts are less influential in shaping public opinion,
- theoretical frameworks are undermined in order to make it impossible for someone to make sense of a certain event, phenomenon, or experience,
- scientific truth is delegitimized

6

## Truth in western philosophy Vittorio Bufacchi

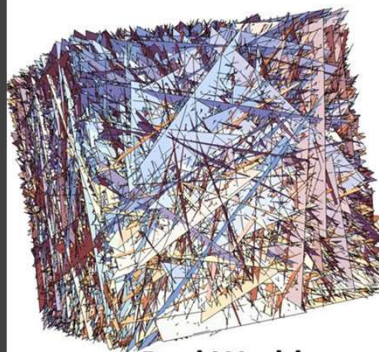
the consent theory of truth is a long-standing view of truth and has gained wide recognition in philosophical circles.

(e.g. Wikipedia discussion about  $2 + 2 = 5$ )

7

## Phenomenon 3

Science and Mathematics have moved on from 19/20<sup>th</sup> century models of reality.



**Real World**

Nassim Nicholas Taleb @nntaleb



### Science

It is unscientific to use science outside its strictly bounded domains.

Science *itself* limits and qualifies claims on matters for which evidence is neither reliable nor sufficient, or in presence of a high degree of opacity.

8

...now there are multiple logics, there is no longer only classical binarist logic.

...there is a proliferation of intermediate logics.

... scientific truth is nowadays much richer than it was two thousand years ago.

## Scientific truth

Fernando Zalamea

9

## Mathematics

Fernando Zalamea

... does not live in the world that surrounds us

It lives in other worlds [...] and often [...] runs ahead of its concrete applications by a margin of several centuries.

10

## Despite widely disparate intentions, these phenomena ...

threaten the privileged position of math (and science) education in our schools, colleges and universities;

provoke fear for the loss of possibilities for rational discourse and establishing truth;

challenge us to re-imagine how and what we are teaching in college math classes;

11

## Enactivist Math Ed theory responds Brent Davis

power is *"the privilege of not having to listen"*  
(pg. 140)

the question of what we know is not distinct from the question of who we are (pg. 141)

we are unable to provide a satisfactory defense for the mandatory study of mathematics in its present form (pg. 147)

we who are involved in education are also actively engaged in the transformation of our culture.... we must seek a *"conversing with that which has been handed down"*  
(pg. 149)

12

## Enactivist Math Ed theory proposes Brent Davis

what is not forbidden is allowed  
pg 234

provocations in topic, then allow and listen for playfulness (*bricolage*) - end goal is fuzzy at best  
pg 220

assessment as '*to sit beside*' (Latin *assidere*)  
pg. 256

errors are not to be '*remediated*' but to be learned from.... requiring '*collective action as much as subjective action*'  
pg. 249

13

## Closer to home Edward Doolittle

The question I have is whether mathematics is really a requirement for all of those trades, or whether it is being used as an arbitrary filter.

The goal of education should be to help increase 'optionality' of our students.

14

## Arbitrary Filters

Post a mathematical assessment task (currently in use) which you would consider an arbitrary filter and the program it is used in.

[https://jamboard.google.com/d/1i1WxeOxAgR3vQFBNa9-NxS3\\_-IO3D4GPOVOH4q8LxIk/edit?usp=sharing](https://jamboard.google.com/d/1i1WxeOxAgR3vQFBNa9-NxS3_-IO3D4GPOVOH4q8LxIk/edit?usp=sharing)

Set up jamboard roughly by disciplines

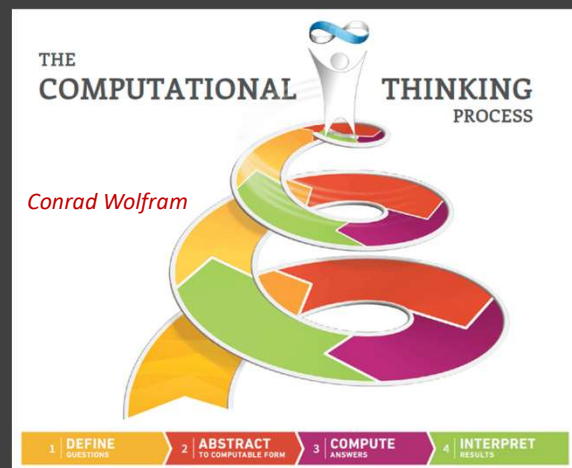
15

## Authentically messy tasks (are they mathematics or numeracy?)

Jordan Ellenberg: *'Dividing one number by another is mere computation; figuring out what you should divide by what is mathematics.'*

Simplistic example: Rather than asking 'which is cheaper' ask 'which would you buy and why?'

The shift from concrete to abstract (and back) – a.k.a. 'computational thinking', 'mathematical thinking' 'quantitative reasoning' or numeracy - is one of the key areas of weakness in math education.



16



## College Math Education Taras' provocations

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... is not really about mathematics

... is stuck with the idea that numeracy is math-lite with a focus on calculations and computations

... is siloed in that math educators and industry experts don't have the time to develop authentically messy tasks

17

## My responses (things I have not been forbidden to do 😊)

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1. mastery-based approach as *'while sitting beside'* assessments. (assess justifications and explanation of meaning)

2. 'Diversity in mathematics' - a freewheeling assignment on a topic of student choosing (math as a tool oppression or emancipation, life story of less famous mathematician, cool math stuff not usually taught in schools) which allows students to have a personal *'conversation with what was handed down'*.

3. playful nature of classroom interactions; lessons do not end neatly packaged in a bow;

4. focus on quantification/abstraction process as explicit goal of 'authentically messy problems'

18

## Let's do it!!!!

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What do we need?

An acknowledgement that a shift is needed, the shift presents us with an authentically messy educational challenge.

Practically: A repository of authentically messy numeracy tasks

19

## Enactivist teaching within the current system?

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What sorts of teaching actions are we *'not forbidden'* to do?

What does a *'conversation with what was handed down'* look like for math educators?

How can we shift our relations with students to make mathematics assessment process more *'collective'* and more like *'sitting beside'* without becoming fraudulent?

What sort of provocations can stimulate play (and authentic mathematical, or quantitative responses)?

20