

Best Paper Award

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Is hereby granted a conference Best Paper in Session Award as determined by a peer review process.

Paper presented: *"Mathematics Anxiety, Mathematics Teacher Efficacy, And Mathematics Avoidance:
A Study Of Primary Teachers In Trinidad And Tobago"*



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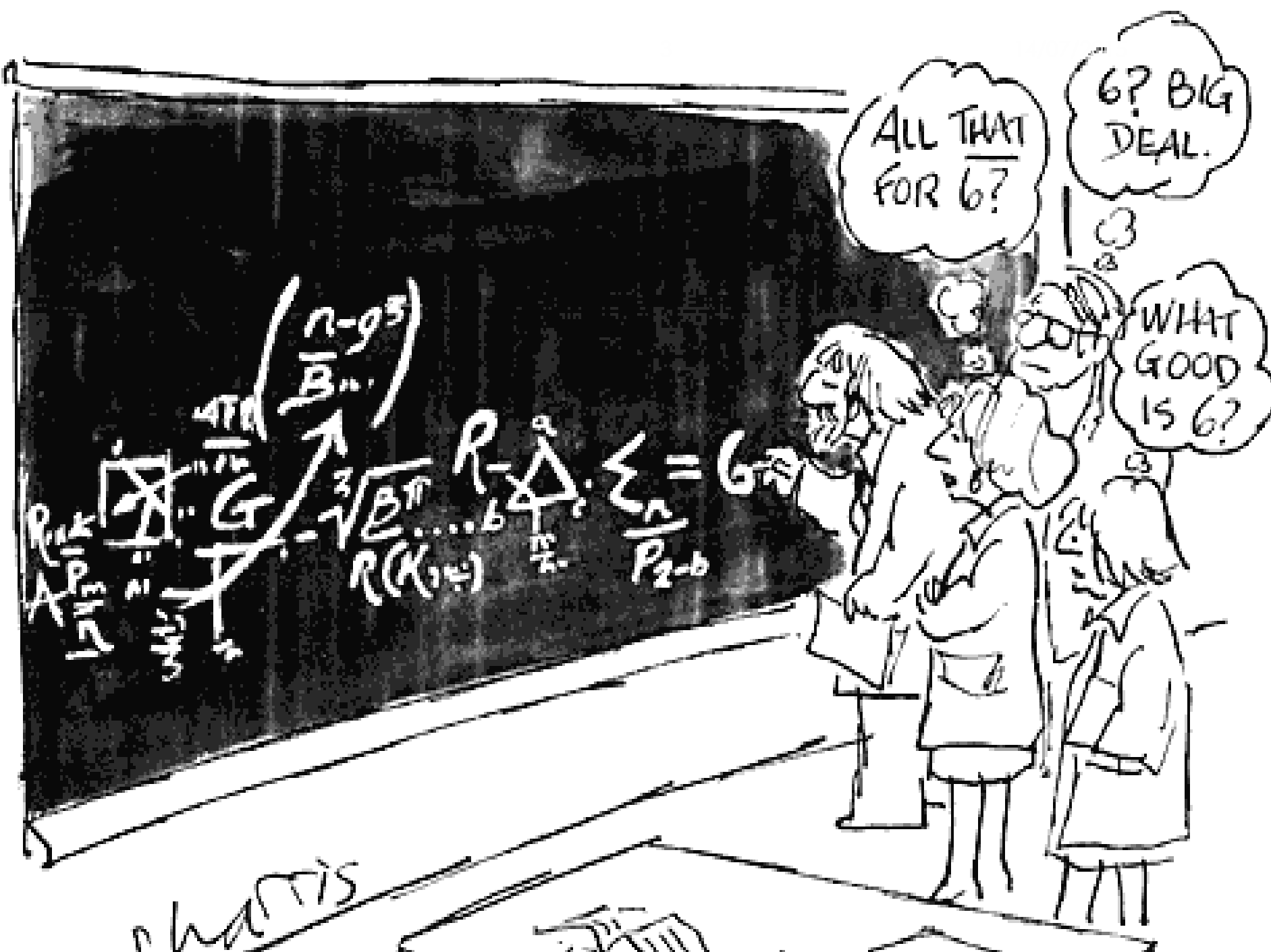


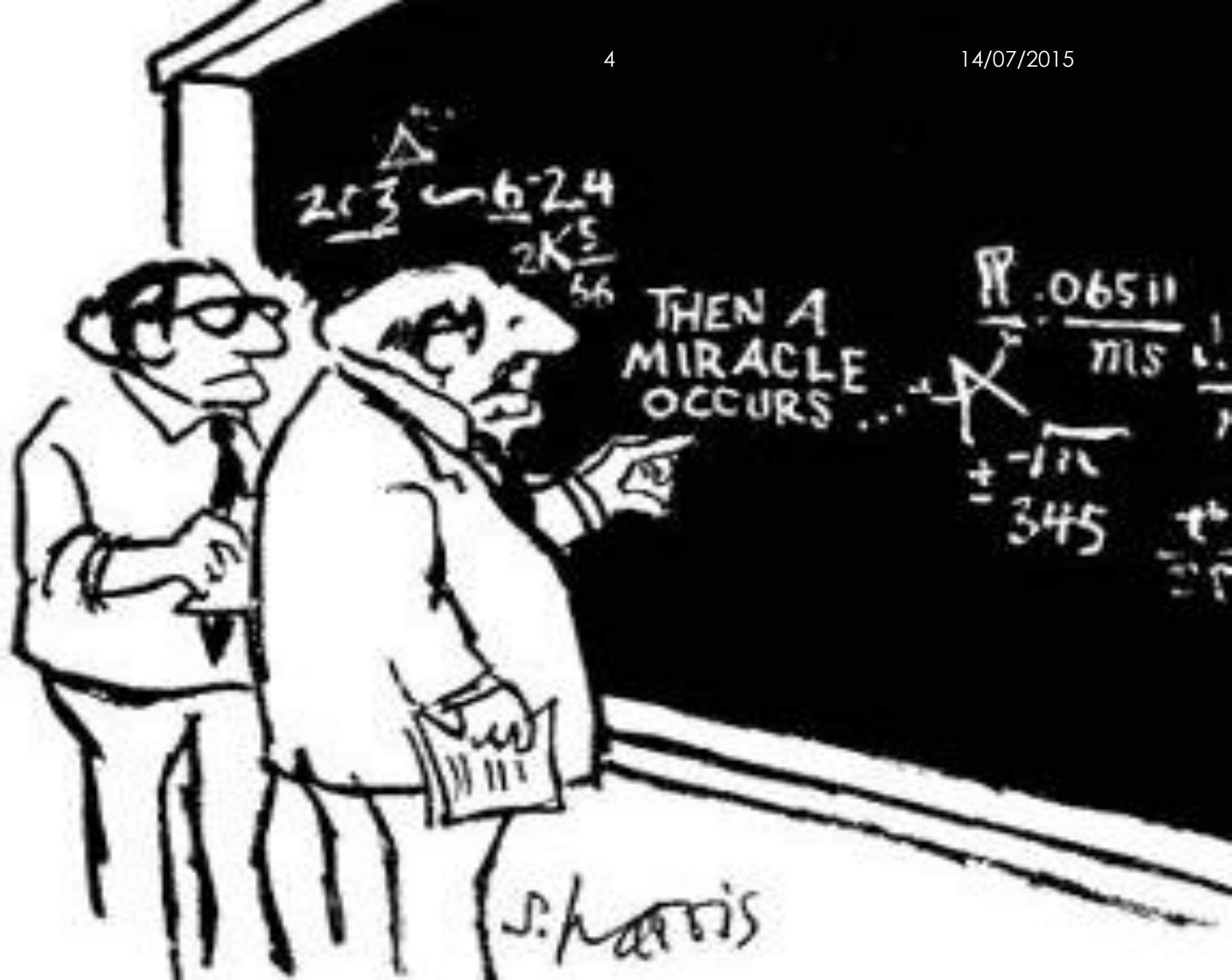
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**MATHEMATICS ANXIETY,
MATHEMATICS TEACHER
EFFICACY, AND
MATHEMATICS AVOIDANCE:
A STUDY OF PRIMARY
TEACHERS IN TRINIDAD AND
TOBAGO**

The Clute Institute
International Education
Conference (2015)







Are these really
primary school
teachers?

I hope Frank
trades his art
class for my
math class

Who'd know if I
skipped
math...once the
kids are busy

Math is
for smart
people

I'm no
good at
numbers

My
family
is bad
at math

I wish I
didn't have
to teach
math

I don't
have a
math mind .



Key Terms

Teacher mathematics anxiety: an intensely negative learned emotional response that teachers experience during preparation for and delivery of mathematics instruction (Gardner & Leak, as cited in Peker, 2009).

Mathematics teaching efficacy: teacher's personal specific-context belief about his/her capability to effectively teach mathematics (Gresham, 2008).

Mathematics avoidance: tendency to seek escape from dealing with mathematical situations (Gunderson, Ramirez, Levine, & Beilock, 2012).

Trinidad and Tobago Context

- High-stake assessment educational environment
- Declining mathematics achievement/attitudes (MoE, 2008)
- Primary **must** teach mathematics
- No specialized teacher training in math content
- Female : male primary teachers = 3 : 1
- High teacher-student ratio ($\cong 1 : 35$)
- Schools under-resources
- Paucity of research evident
- Primary teachers know, can do, can teach math

Research about Student Mathematics Achievement

Linked to

- the teaching-learning environment
- teacher and student conceptual understanding and problem solving competencies
- teachers' beliefs and attitudes towards mathematics

Research about Teacher Mathematics Anxiety

Highly math-anxious teachers:

- pervade the elementary school system
- struggle during lesson preparation and instruction
- overuse traditional teaching/assessment strategies
- become tense and easily agitated with students
- communicate their anxiety to students
- have weak mathematics teaching efficacy
- avoid teaching mathematics when possible
- are younger; female; less experienced.

Research about Mathematics Teaching Efficacy

Teachers with weak mathematics teaching efficacy:

- hold negative attitudes towards their work
- feel less confidence and competent about teaching mathematics than their peers
- are math-anxious
- display more avoidance tendencies
- are younger; female; less experienced

The study purposed to...

1. explore relationships among primary teachers' mathematics anxiety, mathematics teaching efficacy, and mathematics avoidance.
2. determine if teacher variables (sex, age, mathematics attainment and years of teaching experience) were significant factors for them.
3. determine if mathematics anxiety significantly predicted teaching efficacy beliefs.

Methodology

- **Design:** quantitative non-experimental survey
- **Sample:** 68 practicing primary teachers at government and assisted primary schools in Trinidad
- **Variables**
 - **IVs:** Sex; Age; Experience; Math attainment
 - **DVs:** Mathematics Anxiety; Mathematics Teaching Efficacy; Mathematics Avoidance
- **Data analysis:** Stata 12 - reliabilities; means; standard deviations; correlation coefficients; means-difference tests; regression analysis

Instrument - Mathematics Beliefs Questionnaire

Section A: demographic data

Section B: 4-point Likert-type items about

	# of items	Sample Item	Reliability
Mathematics anxiety (Allen, 2001)	10	I don't worry about my ability to solve maths problems.	$\alpha = 0.870$
		My mind goes blank and I can't think clearly when doing maths	
Mathematics teaching efficacy (Enochs, Smith, & Huinker, 2000)	13	I understand maths concepts well enough to effectively teach them.	$\alpha = 0.82$
		I don't believe that I have the necessary skills to teach maths.	
Mathematics avoidance (Allen, 2001)	10	I look forward to teaching math.	$\alpha = 0.746$
		I avoided taking math classes after leaving secondary school.	

Data Management

- Qualitatively tested with 10 primary teachers.
- Response rate: 68 of 100
- Data screening
 - MCAR values replaced with variable means
 - Underlying assumptions satisfied:
 - independence (non-sig Pearson's χ^2)
 - homogeneity of variances (non-sig Levene's statistic)
 - normality (non-sig Shapiro-Wilk statistic)

Profile of survey respondents

Profile	% of study sample
Age group	
30 – 39	64.7
40 – 49	30.9
50 – 59	4.4
Sex	
Female	64.7
Male	35.3
Years of teaching experience	
5 – 15	50
16 – 25	38.8
Over 25	11.2
Ordinary level Mathematics grade	
1	26.5
2	61.8
3	2.9
Below 3	8.8

FINDINGS

Relationships between measures

	r
Mathematics Anxiety – Teacher Efficacy	-.550**
Mathematics Anxiety – Mathematics Avoidance	.618**
Teacher Efficacy – Mathematics Avoidance	-.609**

** Correlation is significant at the 0.01 level (2-tailed)

Higher mathematics anxiety associated with higher avoidance and weaker teaching efficacy beliefs
(cf Kelley & Tomhave, 1985; Swars et al., 2006)

Descriptive Statistics

		Anxiety	Efficacy	Avoidance
Sex	Male	2.32 (.21)	2.25 (.23)	2.15 (.23)
	Female	2.25 (.28)	2.26 (.26)	1.97 (.27)
Years teaching experience	5 – 15	2.29 (.21)	2.29 (.22)	2.15 (.26)
	16 – 25	2.25 (.24)	2.23 (.24)	2.14 (.27)
	Over 25	2.38 (.38)	2.35 (.24)	2.23 (.24)
Age	30 – 39	2.29 (.22)	2.23 (.25)	2.13 (.29)
	40 – 49	2.20 (.29)	2.29 (.26)	2.15 (.22)
	50 – 59	2.53 (.45)	2.38 (.15)	2.18 (.32)
Overall		2.28 (.28)	2.00 (.15)	2.15 (.32)

Means-difference tests

	Sex		Age		Experience	
	<i>F(1, 66)</i>	<i>Sig</i>	<i>F(2, 65)</i>	<i>Sig</i>	<i>F(2, 65)</i>	<i>Sig</i>
Anxiety	1.117	.282	1.711	.080	1.109	.341
Efficacy	0.004	.953	0.884	.418	1.165	.318
Avoidance	6.865	.011	0.111	.896	0.383	.683

Sex significant for only mathematics avoidance.

Males ($M=2.15$, $SD=0.234$) reported significantly higher mathematics avoidance, $F(1,66)=6.865$, $p=0.011$, than females ($M=1.97$, $SD=0.274$).

Mathematics Anxiety Predictors

- Sex, age, teaching experience, and mathematics attainment together did not significantly predict mathematics anxiety ($R^2 = .09$, $F(4,63) = 1.848$, $p = .131$).
- Mathematics attainment significantly predicted mathematics anxiety ($\beta = 0.347$, $p < 0.05$).
- Mathematics anxiety significantly predicted mathematics teaching efficacy ($\beta = 0.66$, $p < 0.05$).

Conclusions about this sample

- Math anxiety evident among teachers. Present but low
- Female teachers felt as efficacious as males, but less math-anxious and math-avoidant than them. Feminization of primary classroom
- Older, more experienced teachers felt more efficacious, but more math-anxious and math-avoidant than younger, less experienced ones. Accumulated mastery experiences strengthen efficacy beliefs
- Teachers' mathematics attainment significantly predicted their mathematics anxiety. Attainment indicative of conceptual understanding.

The way forward in TnT...

Further in-depth research imperative to determine...

- if teacher mathematics anxiety is a systemic problem, and to identify its contributing factors.
- the relationship between teacher mathematics anxiety and student mathematics anxiety, achievement, attitudes and beliefs.
- the relationship between mathematics teaching efficacy and mathematics instruction.
- the influence of teacher training on teacher mathematics anxiety and teacher efficacy.

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