

Raising awareness and addressing statistical anxiety

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How prevalent is maths anxiety in UK?

Baker 2019

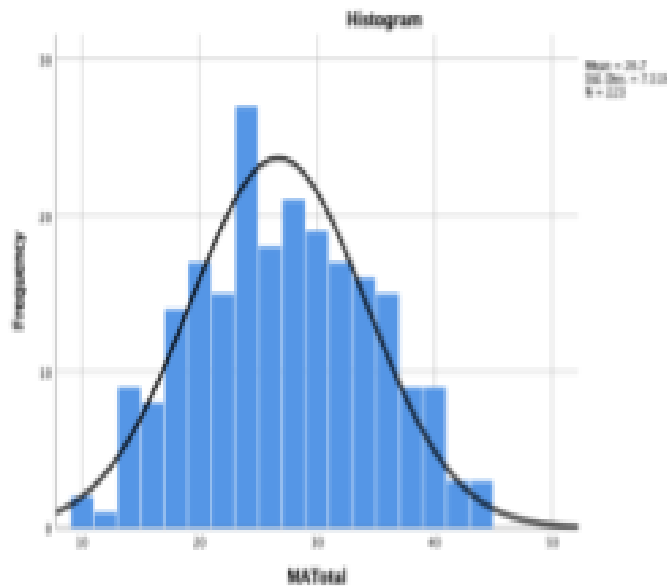


Figure 1 – Distribution of mathematics anxiety

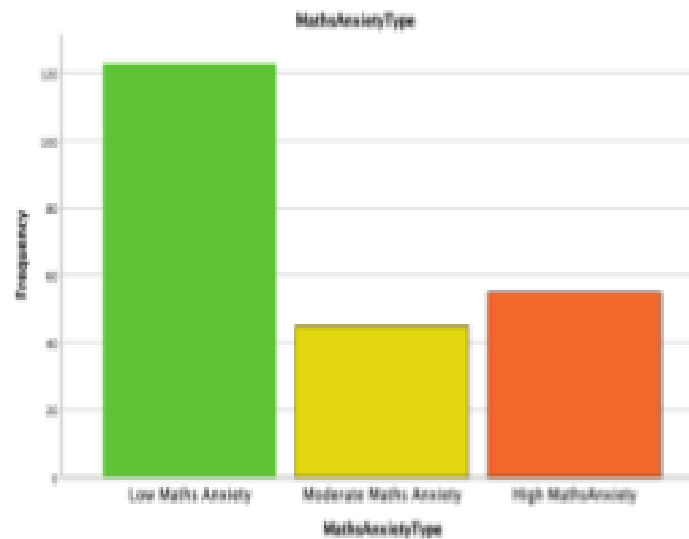


Figure 2 – Grouped mathematics anxiety

The problem

- Learners are naturally curious
- Fear is learned
- Things that cause fear become avoided
- Vicious cycle
- Combined with fixed mindsets:
 “I am not a maths/stats person”
- Self-fulfilling prophecy

The facts

- As a survival strategy the brain seeks to distinguish challenge from threat to well-being
- The brain doesn't distinguish between physical and social threats, such as being left behind or humiliated or shouted at
- Previous threats are remembered
- When the brain (sub-consciously) perceives a threat, it responds by fight or flight mode, at least initially

How do anxious students behave?

Maslow 1962

[Students] grow forward when the delights of growth and anxieties of safety are greater than the anxieties of growth and the delights of safety.

How can we know when a [student] feels safe enough to choose the new step ahead?
Ultimately, the only way is by [their] choices...

Mathematics anxiety...

...as a symptom that basic psychological needs are not being met

Basic psychological needs?

What are they?

- Maslow: safety, then ...
- Deci and Ryan:
 competence, relatedness, autonomy

Resilience

Resilient learners:

“students who succeed despite the presence of adverse conditions”

(Waxman, Gray & Padrón, 2003)

Mathematical resilience:

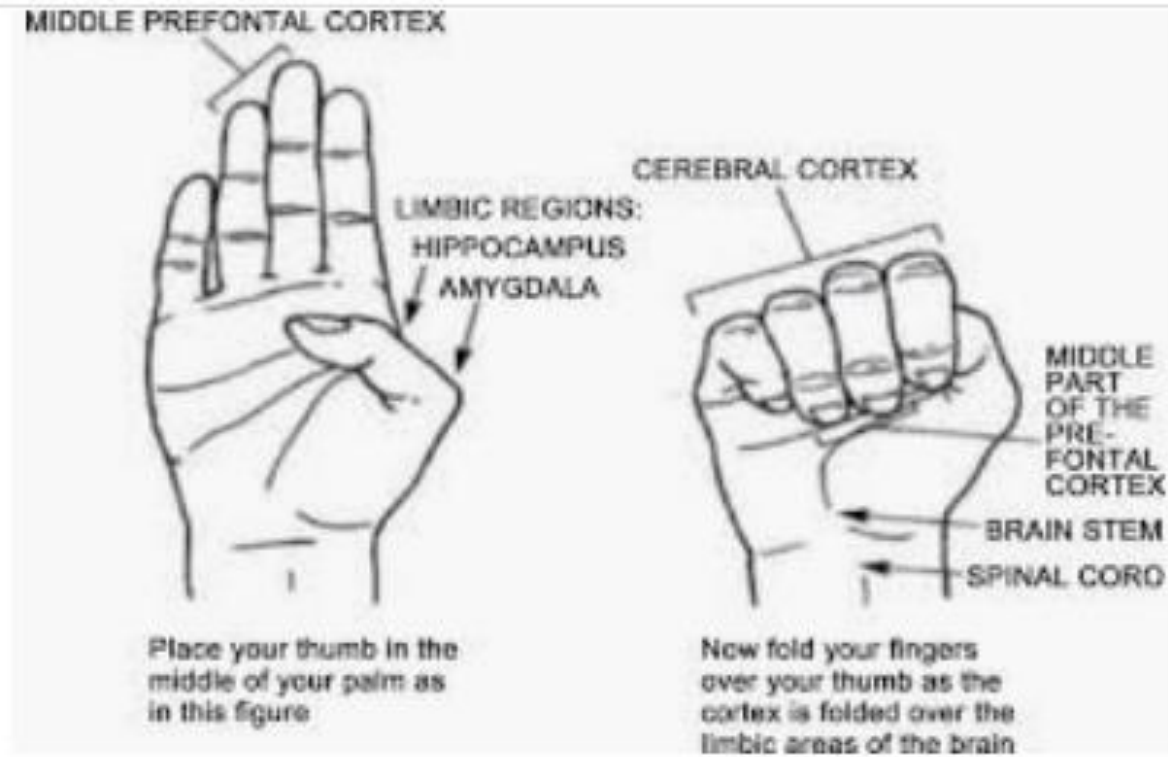
“maintaining self-efficacy in the face of personal or social threat to mathematical well-being”

(Johnston-Wilder & Lee, 2010)

Resilient learners:

- Are flexible, adaptable & tolerate ambiguity
- Anticipate problems & solve them logically
- See creative solutions to *challenges*
- Have positive self-esteem
- Are curious & learn from experience
- Are durable & independent
- Have an internal locus of control
- Have an achievement oriented attitude
- Know how to maintain mathematics well-being/mental health

The hand model of the brain

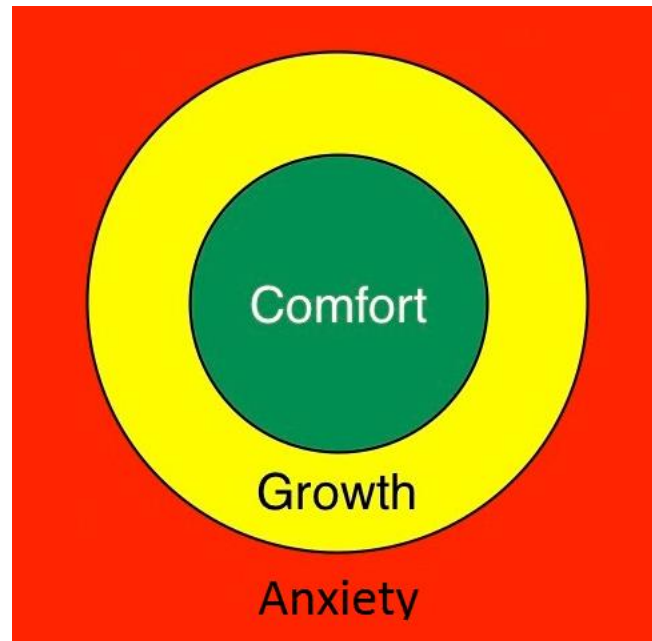


The hand model of the brain

Key message: the brain cant panic and think at the same time

<https://www.youtube.com/watch?v=gm9CIJ74Oxw>

The growth zone model



The three zones

Cruising in the **comfort zone** can build self-confidence & provide opportunities for practice & automaticity.

New learning happens in the **growth zone** – it should be safe to make mistakes, get stuck, require support & find activity challenging & tiring.

The **danger zone** is where what is being asked is not within the learner's reach *at the moment*, even with support. Stress increases and little or no useful learning takes place.

Metaphor

Think of equivalence of physical safety ...

... going on a long hike with students

...climbing a crag with students

Introducing the RAG cards

The growth zone model

- Accept feeling of stupidity in red zone as temporary
- How to get out of the red zone?
- Building experience of being in and extending the orange zone

Getting out of the red zone

- Relaxation response (Benson 2000)
- Rest and digest
- 5/7 breathing
- Focus on 5 things you can hear
- Go for a walk
- Don't try to do stats whilst your brain is focused on the "tiger"!
- Has anyone met mindfulness?
- ...

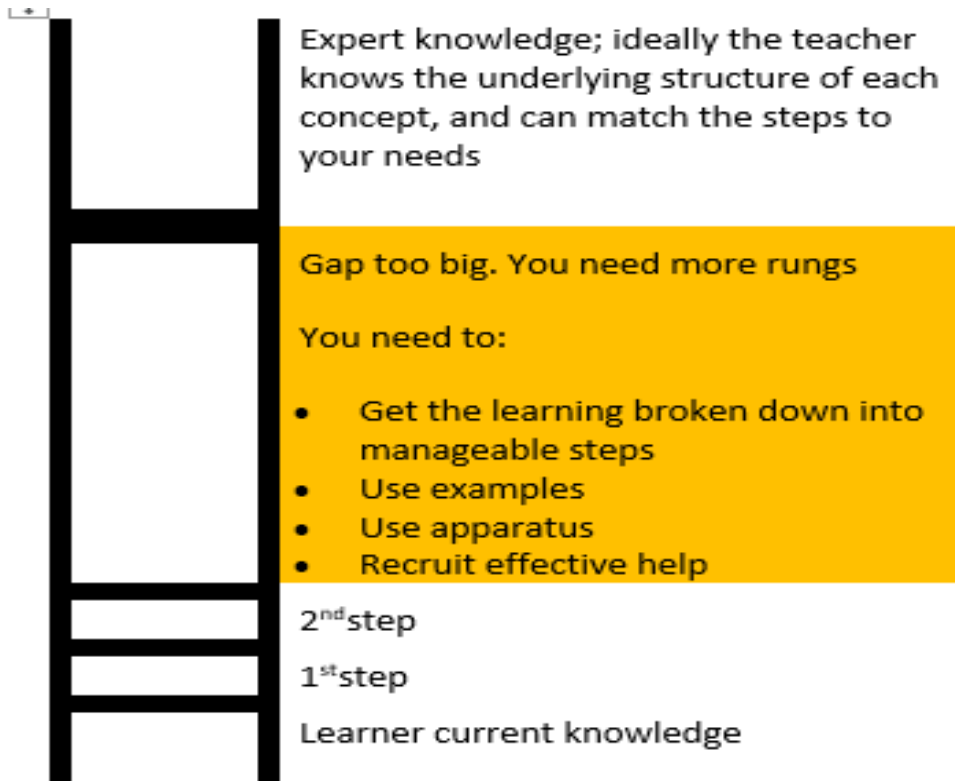
Four elements of orange zone:

- Growth mind set
- Value, purpose or meaning
- Personal agency, struggle & persistence
- Inclusion, support & community

Building the orange zone

- Ask questions
- Try a simpler example
- Support each other
- Use the Internet
- Expect to get stuck
- Expect to make mistakes
- Use rough work
- ...

The ladder model



Bruner's ladder of accessibility

According to Bruner (1966), people learn in **3 stages**:

1. **Enactive**: by handling real objects
2. **Iconic**: through pictures
3. **Symbolic**: through symbols

Moving to the symbolic stage too quickly can interfere with understanding and cause learners to struggle & lose confidence.

Accessible activities allow learners to visualise, manipulate objects and relate maths to the real-world.

Tools in practice

- Red means stop talking and listen! This practice takes a while to develop as a teacher!
- Some teachers give each learner a copy of the GZM to use with a coin
- Some teachers give learners opportunity to write their own words for the feelings in each zone
- How would you use the tools?

Suggestions for further reading

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