European
Life After Stroke
Forum

Lived experience of acalculia after stroke

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#lifeafterstroke

Lived experience of acalculia after stroke

by Colin Jenkinson

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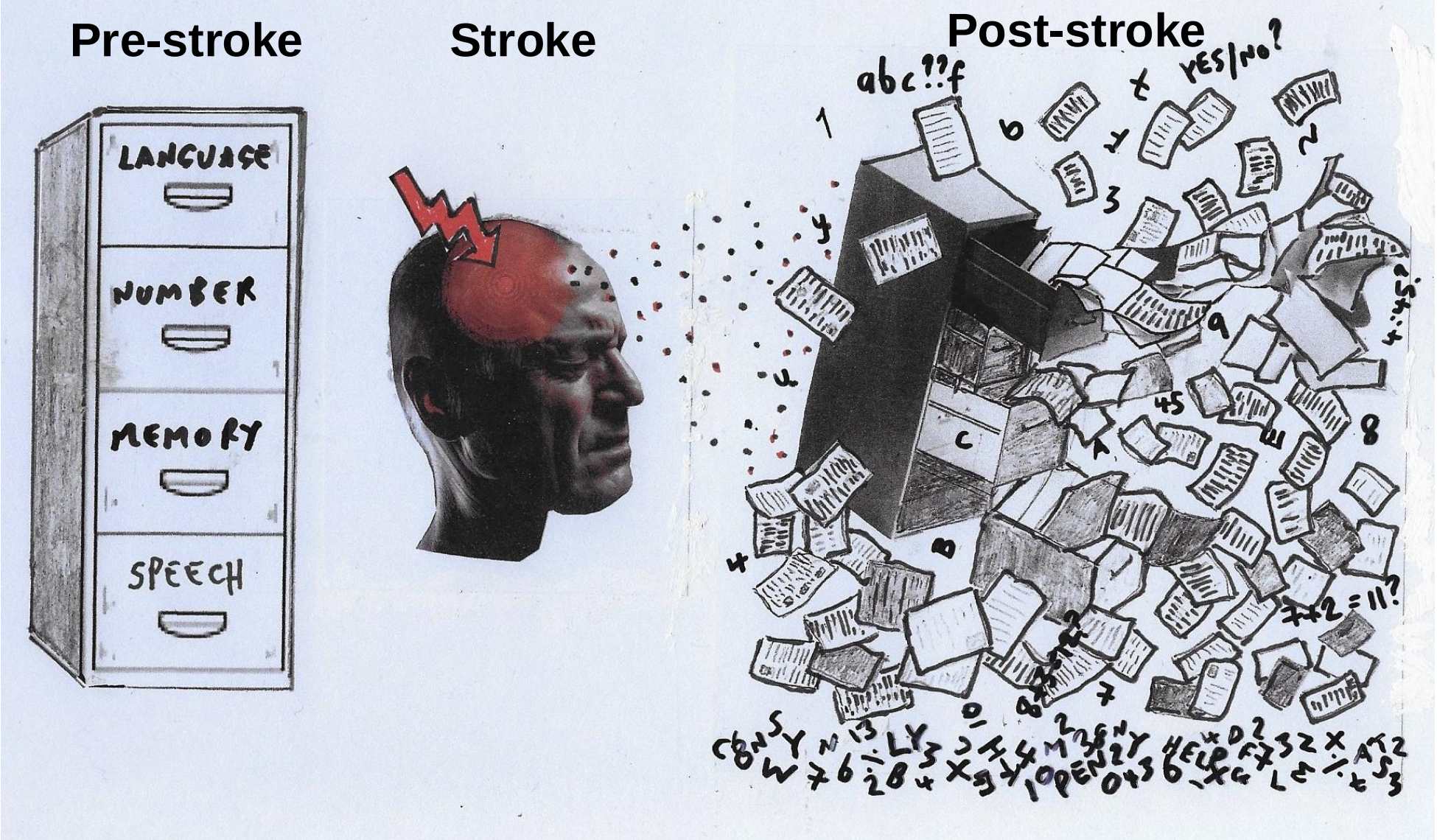
Conflict of Interest Statement

There are no conflicts of interest to declare.

Introduction

- **From Hertfordshire, UK**
- **Maths tutor before stroke in 2016**
- **Post-stroke: aphasia and acalculia.**

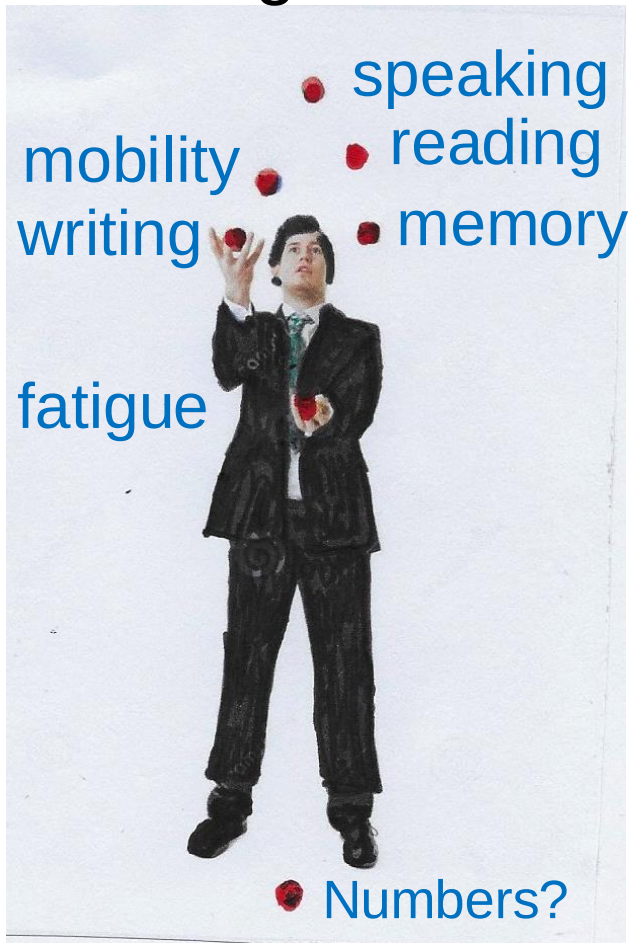
When the words and numbers stopped making sense



I needed help to overcome my problems with numeracy

- **Priority: re-learning speaking, reading, writing**
- **Could not teach for 2 years**
- **Support for numeracy very limited**
- **I needed help**
- **Problems with numbers were not routinely screened for**
- **Eventually regained enough speech and language to take the next step**

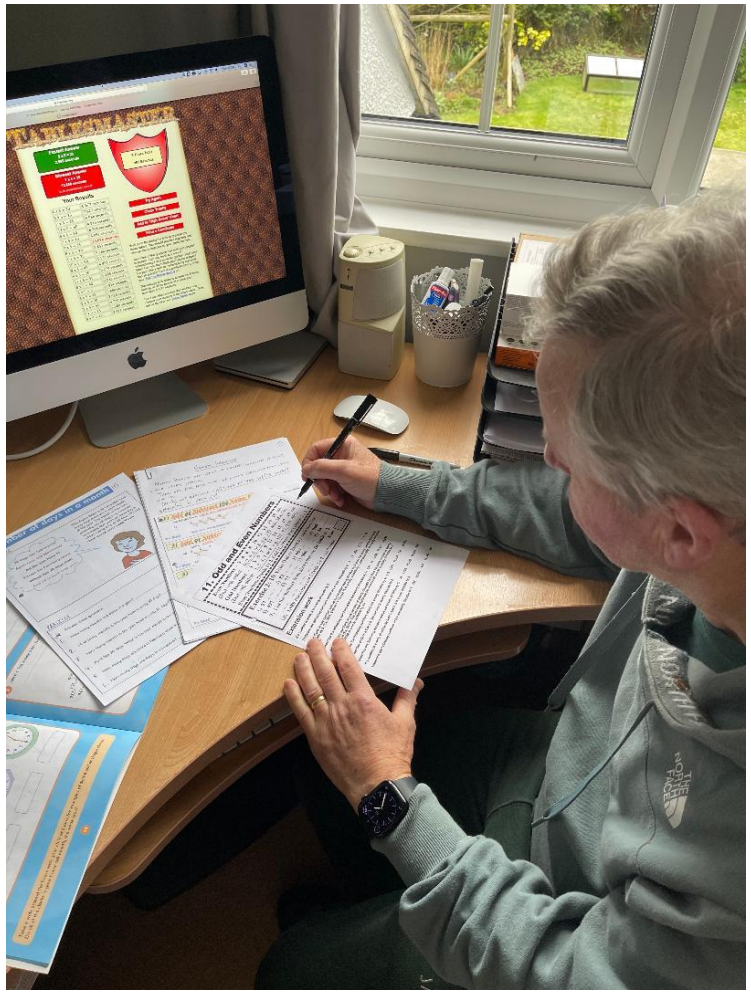
Making choices



I needed help to overcome my problems with numeracy

Developed my own strategies to

re-learn number skills



What did I do?

- Listed ‘lost’ numeracy skills
- Designed and wrote worksheets including:

  techniques

  information

  exercises

  Returned to maths teaching 2018

  unaware of condition called acalculia.

Sample worksheets

Approximating Numbers

Approximate means 'near enough'. It is a rough guide.
Example: 9×98 when calculated comes to **882 exactly**.
For 'easy numbers' we make the **98** into **100**.
9×100 would give an **Approximate Answer of 900.**

Round Numbers give a 'near enough' answer by taking the number up or down to the nearest Power of ten.

To the nearest 10	432 would be → 430
To the nearest 100	167 would be → 200
To the nearest 1,000	3,400 would be → 3,000

A Number of **5 or more Rounds Up**; **4 or less Rounds Down**. Example: **25** would round up to **30** (nearest ten).

Exercise 1 Round these numbers to the: Score

Nearest 10	Nearest 100	Nearest 1,000
1) 26	3) 348	5) 2,500 .....
2) 555	4) 177	6) 6,366 .....

Approximate these Sums (≈ means 'nearly equal to'):

7) $21 + 68 \approx$ ..... 8) $5 \times 29 \approx$ .....
9) $303 - 148 \approx$ ..... 10) $605 \div 21 \approx$ .....

(11) Round these off to the nearest 10:
(a) 776... (b) 594... (c) 85... (d) 27...
(12) Round these numbers off to the nearest Hundred:
(a) 3626... (b) 750... (c) 256... (d) 2951...
(13) What is an approximate answer for 996×31?...
(14) What is an approximate answer for $807 \div 49$?...

Box Method Multiplication

Box Method Multiplication is another way of Multiplying.

Example: **Multiply 155 by 19.**

Step 1
Draw a box 3 squares by 2 squares (this is a 3 digit by 2 digit sum). Split the numbers into their hundreds, tens and units along the top and down the side.
155 = 100 + 50 + 5
19 = 10 + 9

	100	50	5
10			
9			

Step 2
Multiply the numbers at the top and the numbers at the side and put the answer in each box.

	100	50	5
10	1000	500	50
9	900	450	45

Step 3
Take the numbers from the box and write them down, lining up the units on the right. Then Add up the numbers.

1000
500
50
900
450
45 +
2945

The answer is 2945

Exercise 1 Calculate the following: Score

Multiply 342 and 21.

	300	40	2
20			
1			

The answer is .....

2) Multiply 39 by 15.

	30	9
10		
5		

The answer is .....

3) Multiply 78 by 38.

	70	8
30		
8		

The answer is .....

4) Multiply 524 and 53.

	500	20	4
50			
3			

The answer is .....

Do the following sums using Box Method Multiplication:

5) $52 \times 69 =$ ..... 6) $666 \times 77 =$ .....
7) $323 \times 36 =$ ..... 8) $23 \times 765 =$ .....
9) $199 \times 99 =$ ..... 10) $47 \times 68 =$ .....

Exercise 1: Answers (1) 7,182 (2) 585 (3) 2,964 (4) 27,772 (5) 3,588 (6) 51,282 (7) 11,628 (8) 17,595 (9) 19,701 (10) 3,196

Exercise 2: (Extra questions) Work out.
a) 13×18 234 b) 135×27 3645 c) 116×41 4756 d) 264×43 11352 e) 326×24 7824 f) 281×59 16579 g) 286×48 13728 h) 428×34 14552

UK Stroke Assembly 2018

- Met a stroke-survivor researcher
- Maths teacher before stroke, had aphasia, stroke did not affect her maths
- **I thought my maths problems were related to language problems**
- She promised to ‘investigate’
- Emailed me on my birthday about **‘acalculia’**
- **Changed my post-stroke life forever…**

What is acalculia? (pronounced **EY-KAL-KOOL-EE-AH**)

- **acquired disability, following stroke / brain injury**

- **affects 30-65% of survivors**

- **involves:**
  difficulty processing numbers and /or number words,
  performing mathematical calculations,
  understanding quantities

- **acalculia and aphasia can exist separately.**

Symptoms of acalculia to look out for:

- **Anxiety** and **frustration** around numeracy (and avoidance)
- Difficulty **estimating**
- **Cannot count reliably**
- **Reliance on 'counting-on' strategies**
- Writing number **digits the wrong way round**
- **Inconsistent results in addition, subtraction, multiplication & division**
- **Difficulty reading clocks**
- **Sequencing issues**
- **Difficulty with times tables and mental arithmetic**

I became passionate about acalculia

Worked with scientists in Manchester

16 stroke survivors with acalculia and carers.

The Publication

Co-author:

‘A qualitative study into the experience of living with acalculia after stroke and other forms of acquired brain-injury’
Neuropsychological Rehabilitation 2023

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A qualitative study into the experience of living with acalculia after stroke and other forms of acquired brain injury

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ABSTRACT

Acalculia, an acquired disability following a brain injury, involves difficulty processing numerical information and/or calculations. Acalculia is not routinely screened for, and as a result there is a lack of understanding about the nature and prevalence and the impact of the condition. This qualitative study was initiated by stroke survivors with a strong interest in acalculia. Sixteen stroke/brain injury survivors with acalculia and seven carers were interviewed using semi-structured online interviews. Participants ranged in age, gender, time post-onset, country of residence and numeracy level prior to brain injury. Data were analysed using thematic analysis. Three main themes were identified: Awareness and Diagnosis; Emotional and Practical Impact (independence); Support, Coping Strategies and Self-training. Participants and carers repeatedly referred to the lack of awareness and treatment for acalculia and the impact acalculia has had on their lives and independence. Practical impacts included managing money, making appointments, using timetables, organizing social activities and employment, and managing medication. Our results highlight the urgent need to develop suitable assessments and interventions for acalculia and the scope for this to be Patient, Carer and Public involvement (PCPI)-led. The data also reveal useful strategies and suggestions regarding effective timing, targets and approaches for intervention.

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/09602011.2022.2108065.

Study conclusions

- **Substantial unmet clinical need for the management of acalculia**
- **Acalculia is not routinely screened (after stroke)**
- **The condition is under-diagnosed**
- **The condition is inadequately treated**

Study conclusions

Acalculia has a big impact on:

- **everyday life**

- **telling and reading the time**
- **following recipes**
- **banking / using money**
- **shopping**
- **going places**
- **employment**

- **independence and wellbeing**

Study conclusions

- **Profound emotional impact**
- **Frustration** and **embarrassment** by **everyday problems involving numbers.**
- **Feeling dependent on family / carers**

- **Thinking that no-one can help them**

Study conclusions

Urgent need to:

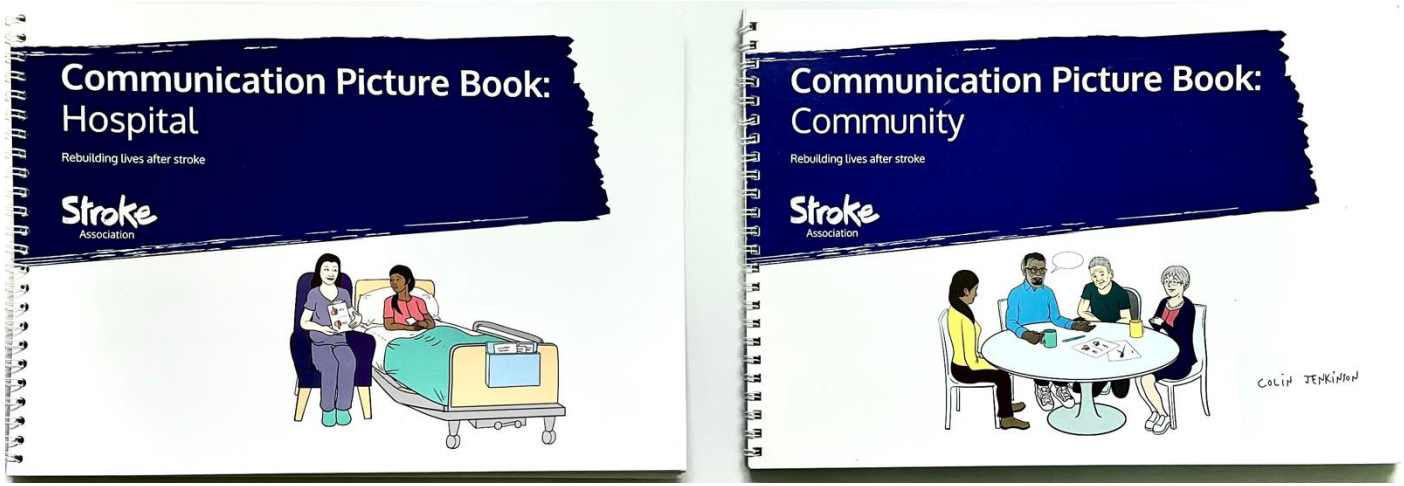
- **increase awareness of acalculia amongst stroke survivors and professionals**

- **develop suitable interventions for rehabilitation of numerical skills**

Making things better

- **UK Stroke Association** projects

2 booklets supporting people with aphasia and acalculia in hospitals and community, plus ‘aphasia friendly’ booklets



With scientists in Manchester, plans for toolkit to help professionals assess numeracy level with their patients and carers.

I would like to finish by saying…

No stroke survivor should be left without help for acalculia

There is life after stroke, we can help make things better for others

What is the next step?