Sigmund and Joe: A Moment in Math

Jerry Ameis

A one-act play with three scenes, set in 1950. A male adult, Joe, is having a therapy session about his math woes with Sigmund, a psychologist.

Scene 1

J: Sigmund, I think I have QREUS and TINK syndromes.

S: Oh, dear! You may have what psychologists like to call DDT (double double tinder). Why do you think you have the syndromes?

J: First let me tell you about Grade 2. The teacher wanted us to know our addition facts by heart. He gave us sheets and sheets of 30 addition questions to do. We had to do them in one minute. I could do them correctly on time even though it was boring. It is a good thing I liked math. Many of my friends could not do the questions correctly fast enough. Some even cried. Doing the sheets made them hate math.

I think it is a good thing to know the facts by heart, but I also understood why 11 is the answer to a fact like 5 + 6. Good thing I understood what addition meant and when to use it to solve problems before I learned the addition facts.

S: Why did you know the addition facts already?

J: My buddy and I helped each other learn. We made special cards that we used five minutes a day. Took us three months to learn the facts, but we did it and had fun doing it. Doing the sheets over and over again didn't seem to help most of my friends learn the facts. They had to get help elsewhere.

Scene 2

S: Okay, but what about the QREUS and TINK syndromes? I only see hints so far.

J: The syndromes really started to rear their heads when I was learning to add big numbers. The teacher told us to line them up vertically and add each column in tum, beginning with the right-hand column. That might have been okay, but when I asked the teacher why to do that he told me because it was the most efficient thing to do. When I asked why the method gave the right answer, the teacher said, "Because." All I could do was say, "But, but, but ..." to myself. And you know very well, Sigmund, that repression is not healthy.

S: There must be more to tell.

J: There is. When I was older I thought about what *efficient* meant. I concluded that it meant getting the correct answer in the fastest way. I tested *efficient* on addition questions. Here is an example. For 768 + 999, lining up the numbers and adding the columns from right to left is not the fastest way to get the answer. It is much faster to add 1000 to 768 and then subtract 1.

S: Aren't you cheating by looking at a special kind of question?

J: Sort of, but the example does poke a hole in the argument that the line-up-vertically-and-begin-with-the-right-hand-column method is the most efficient. The way of thinking in my example can be used in bigger questions to get answers quickly. There also are other ways to add quickly. Sigmund, make up a big addition question.

S: Okay, add 278, 3,456, 991 and 1,425.

J: Let's have a competition. In real life, numbers are not lined up vertically for you. They come in the form of a problem where you have to find the numbers, determine what arithmetic operation to use and, finally, do the arithmetic. We'll leave out the find and determine parts of the problem-solving process and start with the four numbers. You get the answer by the vertical method. I'll get the answer another way. Ready, set, GO!

(Sigmund writes the numbers vertically and adds each column, starting at the right-hand column. Joe writes

the four numbers in a row, four-digit numbers first, then the three-digit. He begins adding by looking at the four-digit numbers. Time passes.)

J: Done. The answer is 6,150.

S: How did you do that so fast? I am just beginning to add the last column. You didn't write much down, either.

J: I began by adding 3,400 and 1,400 mentally, getting 4,800 in my head. Then I added 1,000, getting 5,800. I wrote down –9 to help me remember that, by adding 1,000, I added 9 too much because 991 is 9 less than 1,000. I added 200 in my head, getting 6,000. I added 25 and 56 in my head and added the result to 6,000, getting 6,081. I added 80 to that, getting 6,161 and, to help me remember, wrote down –2 because 78 is 2 less than 80. Finally, I subtracted 11 (9 + 2) from 6,161, getting 6,150 for the answer to the addition.

S: I am convinced. The vertical addition method is not really the most efficient. Your method could even be faster when solving real problems. If the numbers were already there, you wouldn't have to write them down. You could just look at them and begin adding. For the vertical method, you usually would have to begin by writing down the numbers when working with real problems. Only with artificial school arithmetic questions are the numbers already written vertically.

Scene 3

S: Ah, I see it now. You have QREUS and TINK syndromes because you are curious and want to think. When you learned math, you had to repress those longings. This brought on inner turmoil, one that needs to be resolved if you want to live a healthy fulfilled life.

J: Yes, help me. I don't want to be a robot following orders. I want to wonder and feel joy at unravelling wonders. Is there a conspiracy at work? Doesn't the word *robot* come from the eastern European word *robota*, which means *labour*? And you know the political system that governs many of those eastern European countries.

S: Careful, careful. Don't get carried away. Stalin is not responsible for all of the world's ills. Let's just deal with your syndromes. We'll use the context of addition for that. It seems to be a struggle between training people to be robotic calculators and helping people to be thinkers. Are you aware of that? Which do you prefer?

J: Yes, I see that now. I don't want to be a robot. When I was young I felt that I was being held down, with my desire to explore and be creative being crushed.

S: Good. You are part way to resolving your inner turmoil. The nature of a human being is to explore and be creative. You were trying to exert your humanity, but it was being squashed by outside forces.

Let's think more deeply about the vertical adding method. If you know the addition facts by heart, you should have success using the method. But it does not encourage mental arithmetic (other than using the facts). It does not encourage using mathematical principles such as that adding can be done in any order. It does not encourage understanding, because you were told what to do but not why it works. Furthermore, you did not participate in thinking about ways to add. Engaging in the creative process is important to future learning and to working and living. Feel good that you saw flaws with the vertical method. You showed strength, not weakness, in doing so.

J: Yes, yes. I feel my turmoil slipping away. I also see more light through the swirl. There shouldn't be an emphasis on knowing how to do math without an accompanying emphasis on understanding why it works. Both should be part of a whole. A gestalt approach is the most sensible way to look at things.

S: Marvellous! That will be $300, please. And, by the way, come and see me for a session on the goes-into division method. I can do it, but I have no clue why it works or why anyone should learn it. Seems like magic to me.

Jerry Ameis, PhD, is an associate professor at the Faculty of Education, University of Winnipeg. His PhD is in mathematics education and honours mathematics, and his work is primarily in the Access Program for K–8 teacher candidates, where he teaches a mathematics course specifically designed for them, as well as years 4 and 5 mathematics methods courses. His research interests centre on how K–8 students learn mathematics and what kind of mathematics they can learn. His research framework relies on complexity theory and cognitive science, with a strong hint of constructivism.