

# Universals That Are Not: Learning About the Language of Mathematics Around the Dinner Table

by *Christine McCuaig*

My revelation began this summer as I watched the bright young girl from Kuwait before me. Diligently, she completed the tasks that were asked of her. She was working on an assessment package at the Riverside Reception Centre. The centre welcomes new students and families to the Calgary Board of Education, provides information about the school system, reviews boundary maps to establish which school each child will attend and provides a basic assessment during the intake, which involves reviewing prior school records and current proficiencies. I had the privilege of working alongside the talented staff at Riverside Bungalow for four weeks last summer.

What struck me about this particular high school student was how slowly she worked through the math problems we had given her. She made errors in minor calculations that were housed within more challenging problems that she was able to understand and work on. Her report cards indicated that she was a strong student in all areas and had been educated as a bilingual student in English and Arabic. I asked her why she seemed to be struggling with the math. Her answer came as a great surprise to me. I was humbled to learn that what I considered to be a universal—the use of the number system 1, 2, 3, 4, 5, 6, 7, 8, 9, 10—was not! This young girl explained to me that in Kuwait she had been taught a different system to represent the base 10 numbers. I was amazed at this and then realized that an ESL learner may need to translate not only in reading but also in mathematics. I had always assumed that all students were united in their use of common numbers.

The other night in the dining hall here in my University of Toronto residence, I struck up a conversation with three young men at my table whose first languages were Japanese, Hindi and Persian. In the course of our conversation I brought up my surprise at learning of alternative number representations, particularly as an ESL teacher. To my delight the young men added to both my knowledge and my reflection on this topic.

In India, I was told, numbers may be taught in Hindi, especially in rural schools. The numerals would appear as follows<sup>1</sup>:

१	२	३	४	५	६	७	८	९	०
1	2	3	4	5	6	7	8	9	0

Another young man informed me that he had used a Persian system of numerical representation throughout school, in fact right into his university-level math courses. Below are the various number systems taught and used in the Middle East.<sup>2</sup> The first is our familiar number system.

English	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Arabic	٠	١	٢	٣	٤	٥	٦	٧	٨	٩
Farsi	۰	۱	۲	۳	۴	۵	۶	۷	۸	۹
Urdu	۰	۱	۲	۳	۴	۵	۶	۷	۸	۹
Persian / Urdu	۰	۱	۲	۳	۴	۵	۶	۷	۸	۹

To write numbers up to 10 in traditional Japanese Kanji, a system derived from Chinese is used.

I wonder, if language and vocabulary shape our perspectives and our thinking, would the use of an alternative number system influence or enhance our mathematical thinking and reasoning? The students I was sitting with wondered how many people were aware of these different number systems. We mused over the complications of a nonalphabetic language, such as Persian, that requires speakers to write words from right to left but numbers from left to right.

Learning about alternative numerals used in modern cultures has been a revelation for me and has encouraged me to reflect, as I hope you will, also.

Think about the assumptions you hold about what is universal, and contemplate how these assumptions may influence your teaching of and your interactions with students from diverse language and cultural backgrounds. You may be surprised what you learn.

## Note

1. Used with permission from [www.krysstal.com/writing\\_hindi.html](http://www.krysstal.com/writing_hindi.html).

2. The illustrations for English numerals, Arabic numerals, Farsi numerals and Urdu numerals have all been used with

permission from [www.microsoft.com/middleeast/arabicdev/windows/winxp/DigitsSupport.aspx](http://www.microsoft.com/middleeast/arabicdev/windows/winxp/DigitsSupport.aspx). The illustration for Persian/Urdu numerals has been used with permission from [www.bellaonline.com/articles/art46096.asp](http://www.bellaonline.com/articles/art46096.asp).

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