

the **guardian**

ALEX'S ADVENTURES IN NUMBERLAND

HOSTED BY THE GUARDIAN



Abacus adds up to number joy in Japan

The Far East flies high when it comes to numeracy while the West flounders. Is the abacus the secret of their success?



In Japan the abacus is

still sold in shops alongside electronic calculators Photograph: Alex Bellos

Japan is one of the most high tech nations in the world, yet even so a million Japanese children a year learn to calculate using a mechanical, pocket-sized contraption that has been around for millennia.

The abacus, which the Japanese call *soroban*, is an ancient device made up of parallel rods, each containing five beads each.

Once mastered, it enables you to add, multiply, subtract and divide much faster than you can with a paper and pencil – and often almost as quickly as an electronic calculator, as the clip below shows.

(It's pretty impressive. The girl is adding five numbers, each between a billion and ten trillion, as fast as the numbers are read out.)

I recently went to Japan in order to make a BBC Radio 4 documentary on Japanese number culture. My first stop was the Urawa Soroban Academy in Tokyo, one of Japan's 20,000 or so after-school abacus clubs.

There I saw children as young as five perform stunningly fast calculations. My first question was why? What is the point of learning how to calculate fast using an abacus, since we never need to use one in the real world? I have never felt held back by my inability to perform speedy additions of absurdly large numbers.

Urawa Soroban Academy boss Chie Takayanagi says that whereas in the past soroban training had practical use, it remains popular because it brings other benefits that are still relevant, such as concentration and memorisation skills.

And it is also fun. Abacus calculation is treated like a sport. When you reach certain levels you are awarded dans, just like in the martial arts, and there are many local, regional and national competitions. (I went to the All-Japan National Soroban Championship, which will be the subject of a future post.)

For some teachers, like Mina Watanabe, the abacus is important in fostering a love of numbers.

Mina, who lives and teaches in California, said that American children find numbers harder to grasp than Japanese children because they see them as purely abstract, and this leads to many children hating mathematics. When you learn with an abacus, she added, you have a concrete representation of numbers, which makes them easier to understand.

From looking at the children doing their sums, I saw that the abacus also makes intuitive sense. When you add and multiply using a pen and paper, you always start with the units and then work backwards to the tens, hundreds and so on. With the abacus, on the other hand, you start with the leftmost digit of a number, the highest value column, as seen in the clip above, and gradually work your way to the units.

In this way the abacus user begins with an intuitive understanding of the size of the number – something which you do not get when calculating the way we learn at school.



Number squares:

abacus and tartan bag (Picture: Alex Bellos)

When I returned to London I asked Brian Butterworth, professor of cognitive neuropsychology at University College London, if there was any science behind claims that the abacus improves mathematical ability. He replied that the evidence was not at all decisive.

While maths performance might be improved by practising abacus for three hours every day, he said, it would also be improved by doing three hours maths homework every day.

But what the abacus does do, he added, is change the way the brain does the calculation. A person calculating with an abacus uses the visual and motor parts of the brain, unlike a person using pencil and paper.

"It may be the case that actually getting some of the work done in the visual part of the brain does improve mathematics," he said.

Japan, Korea and China always place highly in international surveys of numeracy, and understanding the cultural factors of why this is is of great interest to nations further down the rankings like the UK.

The abacus is not the only cultural difference between the East and the West but its continued presence certainly reflects a culture more in love with numbers than our own.

Land of the Rising Sums is on BBC Radio 4 on October 29 at 11am.

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