The Story of Numbers & the Concept of "Zero"

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Many people think that the numbers we are using today were of Western (i.e. European) origin. This is not true. These numbers are of Arabic origin and Arabic invention. And that is why it is called the *Arabic Numbers* or sometime the *Arabic Numerals* (في العربية تسمّى "الأرقام الغبارية".)

The story behind it is long and intriguing. We know that before its invention the European and Middle Eastern countries, the common numbers used were the **Roman Numbers**:

I	II	III	IV	V	VI	VII	VIII	IX	X	L	C	D	M
1	2	3	4	5	6	7	8	9	10	50	100	500	1000

And that system was difficult and complicated to work with and with many limitations and impossible to use for Arithmetic or Mathematic calculations.

To write 2008 → **MMVIII**

But to write 4372 → **MLDCIXMMDXXX111**

Example of other old systems of numbers

Brahmi   Hindi   Sunscript

There were other primitive systems used around the primitive world prior to the *Arabic Numbers*.

It was **AL- Khwarizmi** الخوارزمی, the "**Father of Algebra**" who, with his ingenious thoughts and brilliant insight, worked and studied hard to find a system that could be used for enumeration .. and to solve equations, etc. He studied the Greek, the Indian and other systems and found them obsolete and lead to no avail.

His ingenuity lead him to use the science of **Geometry** as a base to formulate symbols/figures/numbers, that enumerate the value of the number. He thought of the angles of shapes as the best approach for his system.

And that was how the numbers are born. If you count the angles in each of the numbers it will be noticed that it correlate with the value the number carries. The angles are indicated in the color "**red**" as shown below"-from right to left:


| 1	one angle	2	two angles	3	three angles
4	four angles	5	five angles	6	six angles
7	seven angles	8	eight angles	9	nine angles

(0) the *Zero* No angle

And that is why you find some numbers have tails or crossing or loops or projections and so on. This has a reason behind it which is to make the sufficient angles for the value of the number it denotes. But it is not put haphazardly (without purpose). Of course, the way it is written now-a day is without the sharp angles or the projection of lines, but with curving or semicircular lines – this only to make it easy for the hands and fingers and thus more convenient for smooth writing.
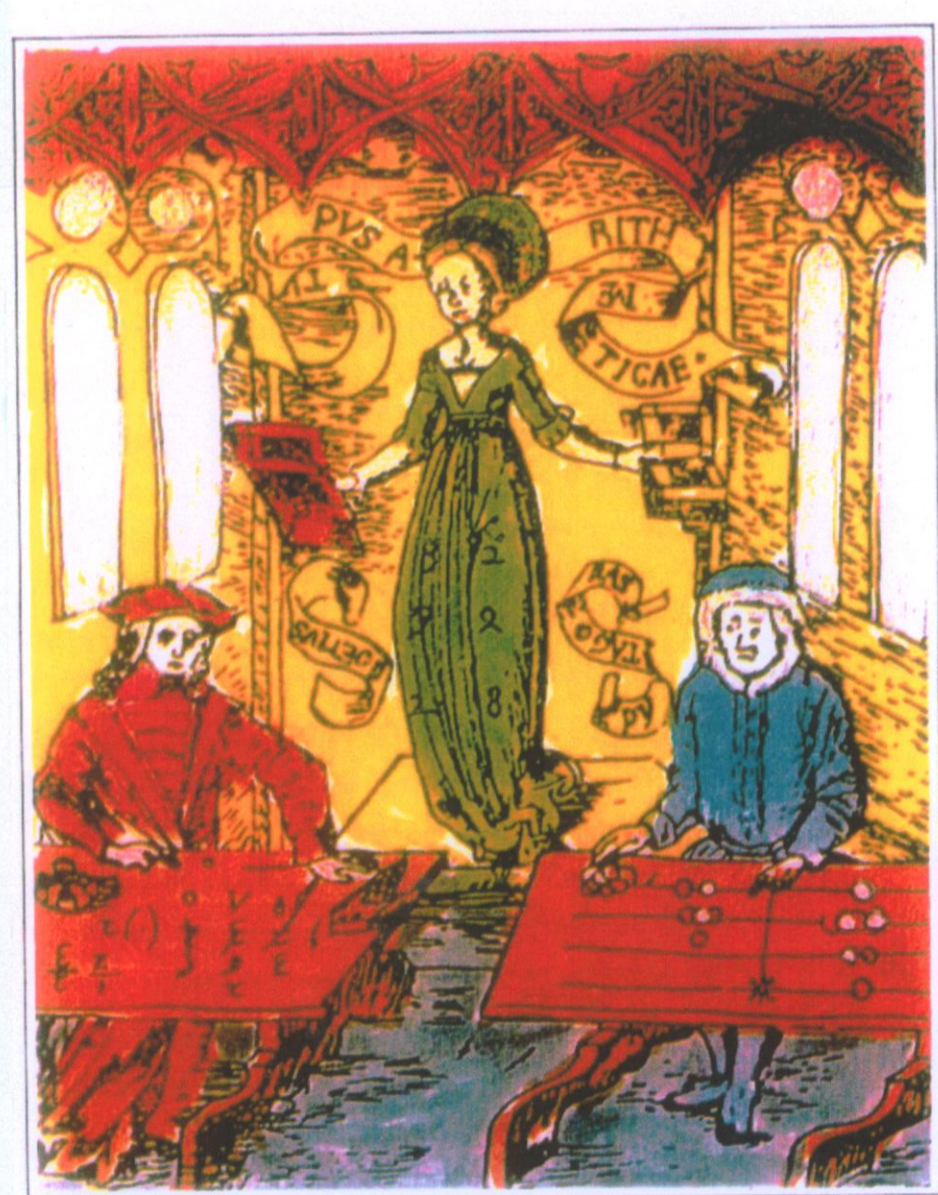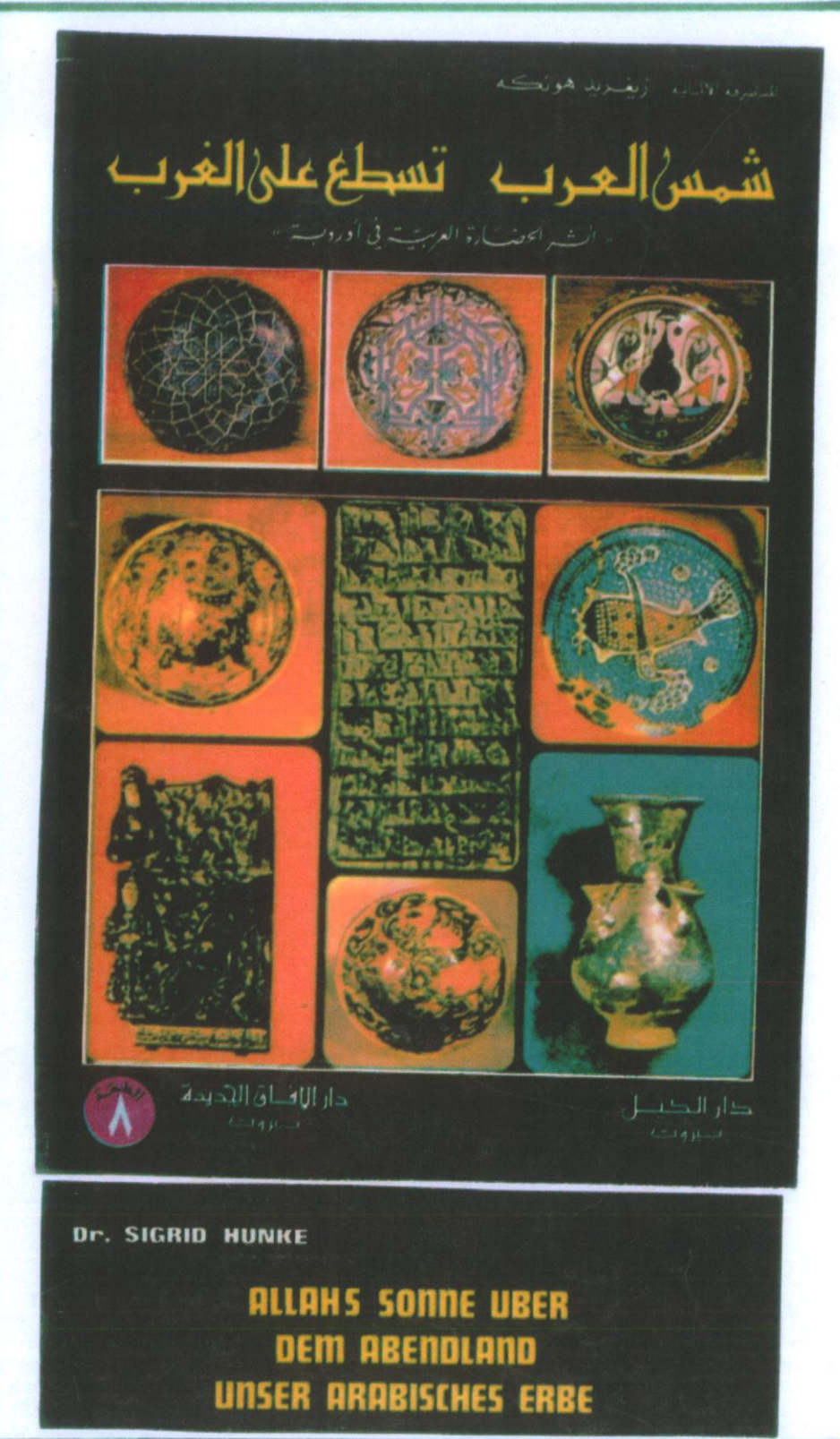

Alkhawarizmi
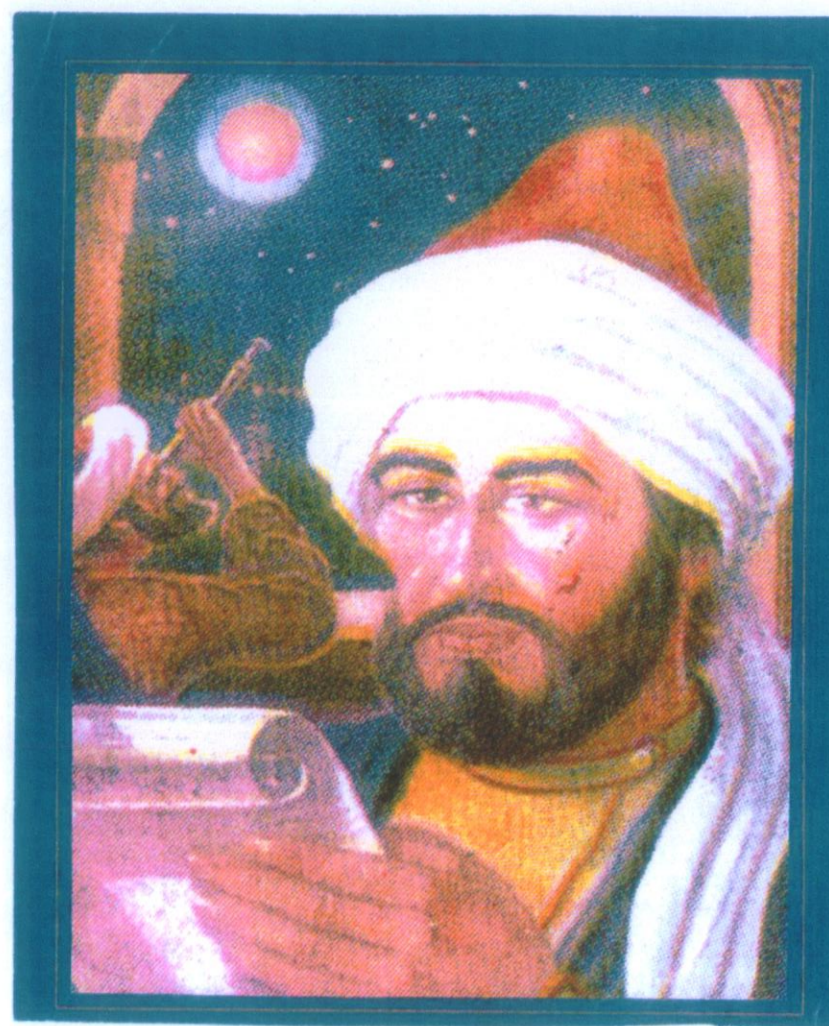
Father of Algebra
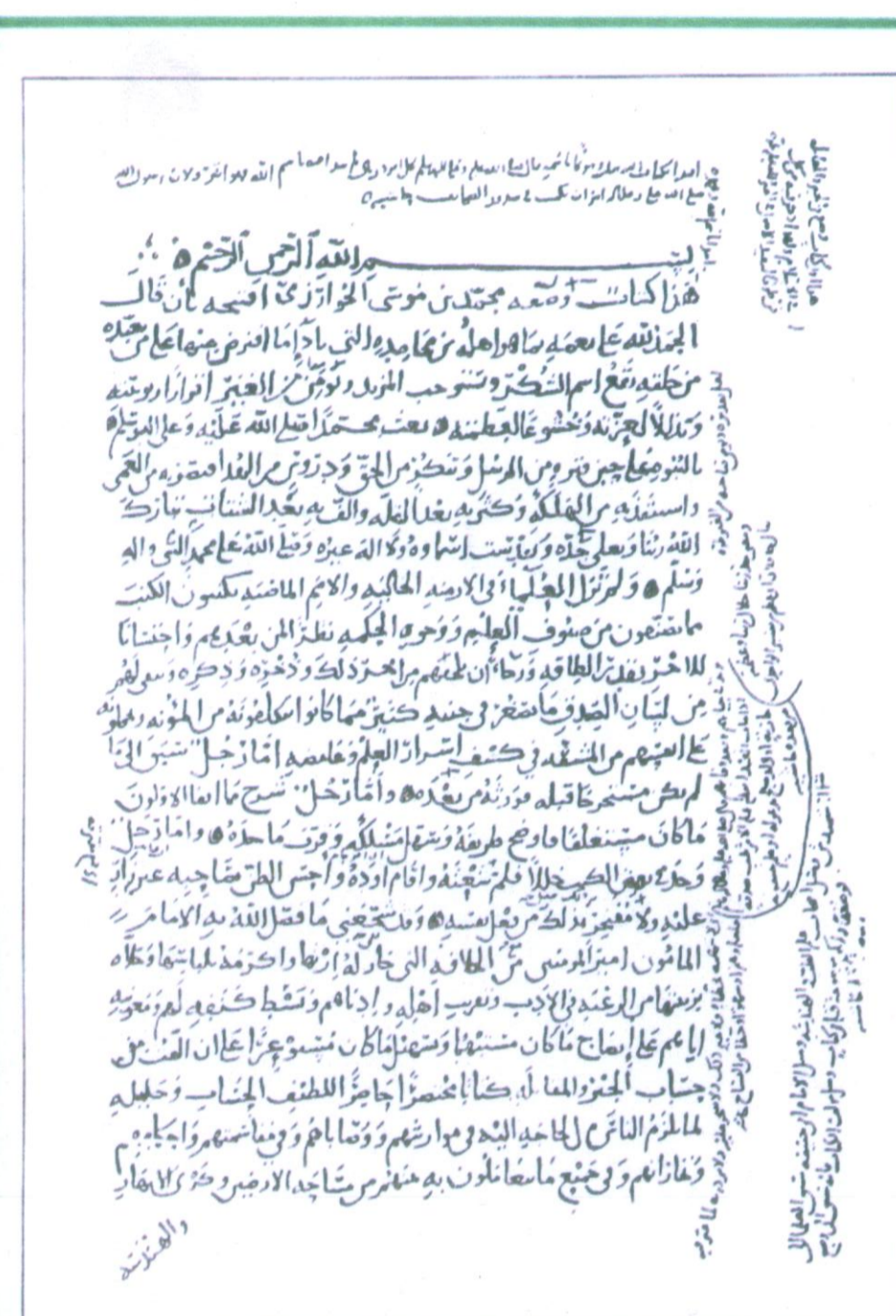
The front cover of Alkhawarizmi
Algebra manuscript.

The competition and battles in the Math science between the advocates of the Greek *"Abacus Method"* of calculations by using colored balls, and the scientific method using the khawarizmi school or method.
.(published by UNESCO in its *History of Humanity*)

شمس العرب تسطع على الغرب

Dr. SIGRID HUNKE

ALLAHS SONNE UBER DEM ABENDLAND UNSER ARABISCHES ERBE

But the story is not finished. What's left is the number "**Ten**" and what comes beyond.

Al Khwarizmi thought that in order to have a complete system of numbers on *infinite continuum* you have to have a symbol for the value of nothing in order to start enumeration. His Brilliance lead him to use the circle "O". And this is also based logically on the science of Geometry because the circle is the only shape/ symbol without angles. That is a value of nothing. And he gave it or called it the Arabic word for nothing "Cipher" "صفر" (or zero in English).

This symbol "0" worked magically when coupled with other numbers. And that is how the problem of the number 10 was solved brilliantly in a fantastic way.

With that concept of **Cipher/Zero** we have a complete set or system that will accommodate all values from nothing to infinity: $O \to \infty$

So what we call zero is only a mere transformation or metamorphosis of the Latin word Cipher- which was borrowed from the **Arabic word Cipher** صفر. This word is still used in naming <u>codes</u> "شفرة." [an agreed upon "secret word" to pass or transmit secret informations.]

The word *Zero* in other European Languages is all derived from the Arabic word صفر'Cipher " –as shown below:

English.	:Cypher, Cipher	Italian.	:Zefro
French.	:Chiffer	Spanish.	:Cifra
Dutch.	:Ziffer	Latin.	:Cephirum

That new system of *Arabic Numbers* and the "**Zero**" created a lengthy controversy and battles in Middle Ages Europe. But the *Arabic Numbers* have won, and had been adapted since then.. but not in most of the Arab World where the system in use is the Hindi (from India) which is, from right to left:

١٠ ٩ ٨ ٧ ٦ ٥ ٤ ٣ ٢ ١ ٠

Where the zero is a dot (٠), which is rather confusing with the decimal point – since the comma (,) is used to segment the large numbers, i.e. thousands, millions, billions ..etc & the dot for fractions .

But this is not the whole story. Because without this set of numbers or the zero in particular, <u>we will not have the digits or the decimal point system or exponential or logarithms</u>. And this is of most importance. How would we be able to write the decimal or the fractions… Moreover, just <u>imagine the world without calculators, computers or any electronic technology</u>. The civilization would have been halted in the 9th centaury. As we know, our life would be much different without the *System of Digits* which is a product of the (zero). Which is the main component of the *Arabic Numbers* or any numbering system.

In fact, when searching in the history and literature of science, we find that the Math Science was known in Europe for many centuries by the name of Logarithms, which is a formulation from the name of Khawarizmi (taken in consideration the European tongue and pronunciation) which is also called Augrim Algrismo, Algoritmus depending on the language and the translation. And it is from that *Arabic* word the Logarithms (exponents) came to exist. In this, we ought to know that the word *Algebra* is an *Arabic* word for aligning a broken two pieces together (just like casting a broken bone) which refers to aligning or broken equations.

Before the *Arabic Numbers* came into existence, the Arabs used what is called the *Jummal Calculation* حساب الجمّل in which each letter of the *Arabic Alphabet* has a value :

9=ط	8=ح	7=ز	6=و	5=هـ	4=د	3=ج	2=ب	1=ا
90=ص	80=ف	70=ع	60=س	50=ن	40=م	30=ل	20=ك	10=ى
900=ظ	800=ض	700=ذ	600=خ	500=ث	400=ت	300=ش	200=ر	100=ق

The letter غ (end of numbers) = 1000