

# **ZerOrigIndia Foundation**

## **Policy Plan 2015-2016**

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*"It is India which gave us the ingenious method of expressing all numbers by means of ten symbols, each symbol receiving a value of position as well as an absolute value, a profound and important idea which appears so simple to us now that we ignore its true merit. But its very simplicity, the great ease which it lent to all computation, puts our arithmetic in the first rank of useful inventions and we appreciate the grandeur of this achievement the more, when we remember that it escaped the genius of Archimedes and Apollonius, two of the greatest men produced by antiquity."*

- Pierre-Simon Laplace, Renowned 18<sup>th</sup> century French astronomer and mathematician

## **1. Introduction**

The ZerOrigIndia Foundation was founded in order to research the origins of the number zero in relation to India together with the philosophy behind it. There is a general acceptance that the zero digit originated in India. There are various references in the literature to support India's claim to the innovation of the zero digit, without ever any mention made of recent, on-going or planned research to unearth fresh evidence:

- The Sanskrit language and the Vedas were predisposed towards the decimal system, containing frequent mention of multiples of ten, a hundred, a thousand et cetera up to stupendously large numbers;
- Pāṇini's grammatical system applied the concept of 'lopa', or absence;
- Pingala's metrics actually used the term śūnya for zero, but no symbol for it, in what was a form of binarism;
- Ancient Jaina works used decimal place-value notation;
- The Bakhshali manuscript used the zero digit as numeral (of uncertain date, estimates ranging from 3<sup>rd</sup> century BCE – 7<sup>th</sup> century CE and even later);
- Aryabhata I (5<sup>th</sup> century CE), famous Indian astronomer-mathematician, used positional decimals plus zero;
- Earliest inscription of zero as placeholder in India at Gwalior temple (876 CE)
- Rival claims are often mentioned such as the Khmère inscription at Sambor (683 CE) and the Malay inscription at Palembang (684 CE), it being pointed out variously that these were 'Indianised' at the time;

These references in the literature might very well establish the use of zero in India, but much research still needs to be done on ancient manuscripts to prove the origin of zero in India. Furthermore, research will need to be done on the manuscripts from other civilizations to exclude them as the place where zero as digit originated.

*The ZerOrigIndia Foundation's research proposal, intended to take place in India and where necessary in other parts of the world, will focus on proving beyond reasonable doubt where and when the zero digit originated in India and if possible by whom it was innovated;*

The zero digit was subsequently transmitted to the rest of the world and was adopted by mathematicians in West Asia, Europe and later most of the world beyond. A part of the original philosophy of zero, that is, the concept of 'emptiness' or 'nothingness' and the related concept of 'creation out of nothingness' (*creatio ex nihilo*), was also adopted by

Western mathematicians and became part of the computational properties of mathematics and, among others, modern physics.

The ZerOrigIndia Foundation, furthermore, aims to explore this philosophy behind zero. It is the working hypothesis of the Foundation, supported by references in the literature on the subject that this philosophy may contain further knowledge of practical and theoretical significance that has as yet remained unexplored. Current mathematics and physics have reached certain limits which may be overcome by the findings of the present research proposal touching on existential issues as to the nature of our universe.

The unexplored philosophy behind the origins of zero is one aspect of the field of knowledge that the ZerOrigIndia Foundation plans to have researched as it may present fresh insights into various logico-syntactical issues that cannot be pursued further under the current state of knowledge and understanding of mathematics and physics, with its mere functional use of zero.

Furthermore, the ZerOrigIndia Foundation will highlight 'the Dutch-connection' as regards the contribution in relation to zero and the extension of the decimal system by so-called 'decimal fractions', popularized in the 17<sup>th</sup> century by Simon Stevin, advisor to the then ruling monarch of the Netherlands, Prince Maurits. As is well-known, Prince Maurits was the second son of the Father of the Fatherland, William the Silent, who had founded the University of Leiden, where Prince Maurits and Simon Stevin first met as students. It may be argued that to a large extent the basis of the present-day topology of the Netherlands characterized by its interconnected waterways, dams and dikes, locks and sluices, may be attributed to the genius of Simon Stevin, on instigation of Prince Maurits. It is in part due to this relationship with The Netherlands that the founders deemed it appropriate to establish the ZerOrigIndia Foundation in The Netherlands.

## **2. Strategy**

### **2.1 Core objectives and principles of the ZerOrigIndia Foundation**

#### **Objectives**

The objectives of the foundation, according to Article 2 of the Charter, are to:

- a. *perform independent scientific research as to the origin of the zero digit in relation to India;*
- b. *To disseminate free of charge all the knowledge/insight acquired by the research through all available public channels, including the educational system and media, and to perform all that is related thereto or that may promote the objectives as well as all other efforts befitting the status of an charitable Institute dedicated to the Public Good.*

The core objective of the ZerOrigIndia Foundation is to facilitate independent academic research on the origin of the zero digit and the related deeper philosophy that may have inspired its innovation in India. Based on the exploratory research conducted by the Foundation, it is considered plausible that ancient manuscripts in archives in India and elsewhere in the world may as yet bring to light important information concerning zero's otherwise inexplicable emergence in India. As the functional adoption of zero has already led to a revolution mathematics, science and technology and the way in which we understand various aspects of our existence, thus a deeper understanding of the philosophy that gave rise to the zero digit may perhaps result in a better understanding of the universe. It is here that the greater Public Good will be served by the proposed research of the ZerOrigIndia Foundation, just as over the centuries zero's functional adoption has played a pivotal role in affecting for the better the lives of people around the globe.

#### **Principles**

The foundation observes the following principles by which it will abide:

- To ensure that all research that takes place under its auspices will be conducted with the highest standards of objectivity, integrity and honesty and to resist pressure of any sort from any quarter that may taint the integrity of the research and its outcome;
- To engage in collaboration with institutions of higher learning and persons of high repute, who are willing to participate without personal gain in the research facilitated by the ZerOrigIndia Foundation;
- To cultivate an open and transparent attitude to allow all information and knowledge regarding the subject to be delivered to and shared with others, hence offering an open platform for exchange of information;

## ***2.2 The first stage***

The very first stage of the research program will be to build and launch a website [www.zerorigindia.org] that can function as a knowledge-sourcing, -sharing, funding and publicity platform. The main functionalities of the website will be: 1) a petition to endorse the research project, 2) a crowdfunding and 3) a crowdsourcing component to facilitate the research project.

The website will enable people across the globe to be approached in order to sign a petition in support of the independent scientific research on the origin of the zero digit in India. If one subsequently would like to go further and donate money, this can be done through the crowdfunding functionality. A more filtered group of academicians, scientists and researchers will be invited to participate through crowdsourcing.

A successful crowdfunding campaign requires that people are given so-called 'perks' or rewards in return for a donation. These will be made available in the form of downloadable audio and video recordings of a special musical composition and visual art posters on the theme of 'zero' commissioned by the Foundation.

To bring the website to the attention of a large audience, a comprehensive network will be mobilized via the Board members of the ZerOrigIndia Foundation. In order to gain the trust of people who come to learn of the Foundation for the very first time, a Committee of Recommendation has been formed comprising persons of international fame and repute.

Directly prior to and after the launch of the website, a widespread (social) media campaign will also be launched to ensure maximum exposure to be accorded to this unique initiative.

## ***2.2 The second stage***

It is important that through crowdfunding and other efforts, funds are collected to initiate a series of staggered research programs that will be kicked-off by the "Camp Zero 2016" brainstorming session in which scientists, researchers and students from different academic backgrounds will come together for a period of 4 to 6 weeks in order to draw up a 'roadmap' for various relevant specializations that will require subsequent multi-year in-depth research during the second stage of the project.

## ***2.3 Absence of profit-making***

The ZerOrigIndia Foundation is a non-profit organization. All the Foundation's proceeds will be solely applied for the purpose of serving the objectives of the organization.

#### ***2.4 Destination of the liquidation balance***

According to the Charter of the ZerOrigIndia Foundation (Article 10, sub 2), the eventual positive balance of the Foundation upon liquidation shall solely be remitted to another organization that also has an ANBI status and thereby serve the Public Good. Furthermore, the Board will also identify an organization that has an objective similar to that of the ZerOrigIndia Foundation.

If the liquidation balance is remitted to an organization outside of The Netherlands, then this organization will also have to serve the Public Good and have similar objectives as does the ZerOrigIndia Foundation.

### **3. Policy**

#### ***3.1 Activities of the Foundation***

The ZerOrigIndia Foundation shall engage in two main activities:

1. To raise funds through various means, including continuous crowdfunding;
2. To formulate and coordinate research programs.

Ad 1.: Crowdfunding is a modern and effective way to raise funds. Moreover, people become involved in the cause, which is supported by them while also serving as an indicator of the importance that people attach to such research. With the help of (social) media people all over the world can be reached and directed towards the website of the Foundation for donating towards the research. The Indian diaspora will also be approached through various Indian diaspora organizations. Besides crowdfunding, other ways and means will be employed to generate donations, including corporate and institutional funders.

Ad 2.: The formulation and execution of the research program will be conducted in conjunction with the Science Committee of the Foundation. The research will be conducted in those geographical places where the right experts and manuscripts may be found. It will be endeavoured to implement various joint research programs that may lead to international cooperation between universities in India and elsewhere in the world. The outcome of the abovementioned Camp Zero 2016 session will be crucial in determining the content of the other research programs.

The Science Committee will also be responsible for oversight of the quality of research and safeguarding the integrity of research so that the results presented are able to withstand scientific scrutiny.

#### ***3.2 Capital of the Foundation***

The Foundation will not maintain higher capital reserves than necessary for the continuity of the planned activities towards the realization of the objectives of the organization.

On a yearly basis, an estimate will be made of the cost of the research for the coming year. Fundraising will be done in accordance with the financial requirements of the research costs. Any positive balance at the end of the year will be prorated to financing research in the upcoming year. Having said this, it is possible that a capital reserve is maintained during a longer period because there are research programs that will run over a period of 3 to 4 years. These capital reserves will then be earmarked for these research programs. The Foundation will never accumulate capital without having a specific research destination that serves the objective of the Foundation.

### **3.3 Spending policy**

The ZerOrigIndia Foundation shall allocate the funds collected in line with its objectives towards the following research projects:

In the short-term:

ZerOrigIndia Foundation proposes to organize 'Camp Zero 2016' of approximately 3-4 weeks at a prominent university in India. The aim is as follows:

- select a team of about 20 young students/graduates/post-docs for this Camp Zero event to brainstorm about the so-called zero-project and to submit a written proposal for the overall zero project, which is to be carried out in various related fields of expertise;
- the written proposal is to be worked out with a view to publish a joint paper on the subject;
- the paper is also to be used as basis for the online crowdsourcing component of the ZerOrigIndia Foundation website, which is presently being built;
- the group of 20 students thus comprise part of the selection process for the team that will eventually conduct the research, which will take years to complete;
- 'bonding' activities will be promoted to nurture a global community in support of the zero project;

The central research question to be addressed: The project would serve the twin purpose of finding fresh evidence of zero's earliest appearance in India, and in the process refocus attention on the unprecedented significance of zero in its own right, as part of the decimal system, and its subsequent impact on scientific progress in the world. Furthermore, the proposed study aims to present evidence of the concept of emptiness/fullness [shunya/purna] to be a necessary, but not necessarily sufficient, precondition for the emergence of zero as fully-fledged numeral – an event unique in world history.

The planning for the Camp Zero 2016: Specific assignments are yet to be formulated, depending on recruitment of researchers.

Venue: Preferably a university or research institute in India having an excellent library and archives of ancient manuscripts onsite and/or available through its network. Collaboration with reputed university elsewhere in the world.

Budget: Online crowdfunding campaign [approximate target amount \$1500 per participant, with assistance from the hosting university and/or the Indian Council for Cultural Relations (ICCR), if possible. Foreign participants are expected to pay for their own return flight to India. It may be mentioned that ICCR had appointed a ZerOrigIndia Board member as Academic Coordinator for a Conference on a related topic, to be organised by ICCR in Bangalore.



In the medium-long term:

To build on the findings of the above project, and to be financed by subsequent crowdfunding campaigns. Whereas the Camp Zero 2016 project involves graduate and/or postgraduate students for a period of only 4-6 weeks, in the longer term, such students as are selected from the above Camp Zero 2016 project and other academics would pursue the detailed research proposal formulated by the earlier team. It would involve focused multi-year research projects intended to find any evidence of zero's origins in India. In all cases regular progress reports would be posted on the website for interested supporters of the campaign to be kept abreast of findings, which would also be publicized in professional journals but also presented to mainstream media and in scheduled presentations to laymen and professional audiences alike, with special focus on high schools and colleges.

#### ***3.4 Disposal to capital***

The ZerOrigIndia Foundation's Board of Trustees alone decide on the disposal of the Foundation's financial assets. No other person or organization shall, in any way, have a decisive say in the financial matters of the Foundation or will have access to the capital.

## **4. Miscellaneous**

### **4.1 Remuneration policy**

The ZerOrigIndia Foundation, according to the Articles of Association, shall not pay any remuneration to the Board members, other than compensation for expenses incurred for performance in the line of duty and/or reasonable attendance cost.

For work performed of a non-policy but chiefly executive nature, compensation will be paid in conformity with market rates. In such cases, the Board shall conclude a contract with the person concerned in the form of a labor agreement or otherwise.

The remuneration policy shall aim to reward staff in accordance with standards that are acceptable and accountable to society, and befitting the status of the Foundation as charitable institution pursuing the Public Good.

When the funds of the foundation so allow, a project leader / program director will be appointed by the foundation. The salary of the program director shall be sober and befitting of a person working in the cultural and educational sector.

Both as pertaining to the compensation of expenses of the Trustees as well as to contracting and, as such, remunerating staff, the condition applies that this shall only take place inasmuch as the financial means of the Foundation permit. As such the level of aforementioned remuneration is maximized and shall only be disbursed in case of available funds. In the event of insufficient financial means, remuneration shall be prorated and adjusted downwards

### **4.2 Description of the administrative organization**

The Foundation will create a yearly budget that will be approved by the entire Board of Trustees. Financial commitments shall be entertained only when there are sufficient funds in the account of the Foundation.

Financial commitments and payments up to Euro 500,- may be made by the treasurer without the consent of the other Board members, provided these fit the budget. In a later stage, when the Foundation has enough funds to support a program director/ project leader, he shall be mandated for financial commitments up to Euro 500,- without the prior consent of the entire Board, again only if these commitments are covered by the budget.

All financial commitments above Euro 500,- may be made only by the treasurer and the chairperson who will do so under the mandate of the Board which has approved the budget and a strategic plan of action. The financial payments shall be prepared by the accountant and presented monthly or bi-monthly (depending upon the frequency of bills received) and given to the Treasurer for approval. An overview of all revenues and costs shall be sent to all the Board members on a quarterly basis.

#### **4.3 Publication obligation**

The ZerOrigIndia Foundation shall annually post a consumer friendly version of its Policy Plan on its website [www.zerorigindia.org](http://www.zerorigindia.org)

# ZERORIGINDIA

## Transmission of the Decimal System plus Zero via the Islamic World

Aryabhata I (476–550) was one of the greatest mathematicians and astronomers in India, indeed the world. He predicted that the Earth spins on its axis when Europeans still thought it was stationary and flat. Centuries later his concept of 'jya' was translated by the Arabs as 'jiba'. In the 12th century, the Arab text was mistranslated in Latin as 'jaib', which meant 'pocket', or 'sinus' in Latin and so ended up as our word 'sine' in mathematics.

ZERO took a similar route, causing similar confusion, from the Venetian *zevero* or *zefiro*, taken from *ṣafira* or *ṣifr*, the Arabic translation for the Sanskrit word *śūnya* (शून्य), which meant 'empty', but which was taken in Europe for 'cipher' or secret code and as such resisted. A long and tortuous road that ZERO travelled, but nowadays helps to save lives.

The *Brahmasphutasiddhanta* is the earliest known text to treat zero as a number in its own right, rather than as simply a placeholder digit in representing another number as was done by the Babylonians or as a symbol for a lack of quantity as was done by Ptolemy and the Romans.

The real impact of Brahmagupta's discoveries was felt in the Islamic world, where **Khalif Abbasid al-Mansoor (712–775)** invited the scholar Kanka from Ujjain (India) to lecture on Brahmagupta's applications of mathematics to astronomy. The king ordered Brahmagupta's writings translated into Arabic in 771, and they had a major impact on subsequent writers in the Islamic world, including al-Khwarizmi, the "father of algebra." The mathematical thought of medieval and early modern Europe was influenced by Islamic models that had been in existence for centuries. Distant from modern mathematics in time and place, Brahmagupta nevertheless exerted a definite influence on mathematics as the discipline is known today.



Gold dinar of al-Mansur

ZerOrigIndia Foundation

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**Son Excellence Monsieur Amokrane Mourad**

Chargé d'affaires à l'Ambassade de la République Algérienne d. et p.

Van Stolklaan 1-3

2585 JS La Haye

Monsieur le Chargé d'affaires,

Votre Excellence, assisté par Monsieur Rafik Kessai, a bien voulu accorder à Monsieur l'Ambassadeur Eric Niehe et moi une audience, dont nous vous remercions vivement, afin de parler sur l'objectif de notre fondation dite **ZerOrigIndia**, c.à.d. trouver l'origine du chiffre zéro, qui se trouve probablement aux Indes, mais même cela n'est pas certaine. Le zéro est très important dans la science d'algèbre et indispensable pour opérer les ordinateurs. L'origine du zéro n'est toujours pas certaine, mais c'est un fait que la connaissance du zéro a été introduite en Europe par Leonardo Fibonacci, un ressortissant de la ville de Béjaïa et qu'il a vécu sous la dynastie des Marinides, d'origine de Béjaïa, qui venait de monter sur le trône.

Notre fondation est en train d'obtenir des contributions pour une monographie à publier sur l'origine du chiffre zéro. Votre ambassade cherchera s'il y a une possibilité d'obtenir des contributions académiques sur le rôle cardinal joué par l'Algérie dans ce processus, ainsi que par quelle voie le zéro est venu en Algérie. Après la publication de cette monographie on pense à organiser une conférence sur ce sujet pour les auteurs des articles de la monographie, peut-être à l'Université Libre d'Amsterdam, soit l'Oxford University Press ou bien à l'Imprimerie Royale Brill. Les frais de déplacement et d'hébergement des auteurs algériens sont peut-être disponibles au sein de l'Université de Béjaïa. Toute assistance de l'Ambassade sera hautement appréciée.

Daignez agréer, Monsieur le Chargé d'affaires, avec nos remerciements de votre accueil, l'expression de ma parfaite considération.

Au nom de la fondation **ZerOrigIndia**,

Pierre Keesom

membre du comité directeur

*Keesom & Houdijk N.V.*

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