Design Resource

Edakoodam

Burr Puzzle

by
Prof. Arun Mascarenhas
IDC, IIT Bombay

Source:
https://dsource.in/resource/edakoodam

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Source:
https://dsource.in/resource/edakoodam/about-edakoodam

About Edakoodam

Building structures out of stone blocks or wooden logs must undoubtedly be one of humankind's most primitive and deeply rooted instincts. Most ancient pastimes and games use pebbles, beans, scratch marks on the ground, and other such things that are readily at hand. Probably, many would associate the word puzzle with some tasks that are purposely confusing or difficult. The term puzzle is used just about any geometrical or logical recreation having parts that come apart and fit back together. These recreations in geometrical assembly patterns have a universal appeal that transcends all cultural boundaries and age groups.

Few Designs of Ilsung Mala.

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The Oxford English Dictionary dates the word 'Puzzle' to the end of the 16th century. First as a 'verb' and later came to be used as an 'abstract noun' meaning 'the state or condition of being puzzled.' A similar meaning word, 'Edakoodam,' is familiar to most Malayalam-speaking folks in southern India. Which means 'a puzzle that is difficult to solve' or 'to do something thoughtlessly.' Incidentally, this word is also used as a noun for the burr puzzles.' 'Tharumaru' is another word in the native 'Tamil' language that means something 'not in order' used interchangeably in the place of Edakoodam.

Proper understanding of geometrical puzzles should probably begin with a historical overview. The problem is, one can usually find at least a brief written history of any possible subject, but not so for the geometrical puzzles. The marketing tactic of recent puzzle manufacturers is to invent stories of their ancient origins. Often, we see the source of many puzzle designs is an association with Eastern origins. There are similar legends on martial arts' roots in southern India and spreading with religious and cultural migrations to Eastern countries.

Given that the words like 'Edakoodam' in ancient languages like Malayalam and Tamil have a similar meaning to that of puzzles, they are probably closer to the truth. It is impossible to decipher many such origins due to the lack of reliable evidence due to oral traditions in the Indian subcontinent instead of written documentation. However, India had a robust guild system until the arrival of colonial powers that predated the common era. It was known for its highly developed knowledge of mathematics, shipbuilding techniques, and skilled artisans in the ancient world.

In puzzle nomenclature, burrs are assemblies of interlocking notched sticks. They are traditionally square wooden blocks. Reasonably, it must have evolved over thousands of years of building activity. Wooden toys have been a part of India's craft landscape since the beginning of the civilizations. We can only speculate, of all three-dimensional puzzles, the burrs are certainly the easiest to make and probably the earliest to have become popular.

To give credit where it is most due, the fascinating world of geometrical dissections, in general, is Greek in origin. The oldest known mechanical puzzle came from Greece and appeared in the 3rd century BC. The game consists of a square divided into 14 parts, and the aim was to create different shapes from these pieces. A William Jones catalog of 1787 lists few puzzles. In the 1840s, Mr. Crambrook produced a record with over 100 puzzles and held what is believed to be the first-ever puzzle exhibition. In 1893 Professor Hoffmann published his "Puzzles Old and New," listing several hundred puzzles in current production. If we see the entire world's recreations, even that number was minimal.

Patent files are one of our most important historical records on puzzles. There are presently more than 1000 patents of bona fide puzzles filed in the British Patent Office and about the same number in the United States Patent Office. The oldest US patent is dated 1863. If the filing of patents is an accurate indication, then many of the classic designs that are familiar to us today, including various burrs and dissected blocks, date from the late

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1800s. Obsessions for puzzles started in 1817 when a Chinese Tangram trend swept both Europe and the USA. Around the 1920s, there is a decline in puzzle interest and patent activity, which coincides with the phenomenal rise in the automobile's popularity. Puzzle interest picks up again after World War II. The Rubik's cube's craze of the 1980s is yet another trend and has been going strong ever since.

There are various types of fascinating and intriguing designs that we see today. Handmade puzzles attribute to their ability to challenge and satisfy their craftsman. Creating any puzzle requires the most careful craft and strict adherence to dimensions. The challenge of creating simple-looking burrs, driven by mathematical accuracy and skill, is one worth admiring when speaking of wooden puzzles. That holds the value of gratification when solved successfully and doesn't disappoint so profoundly, given they are just for fun.

Many of the designs have been produced commercially, and probably many more will be in the future. However, the only economical way to mass-produce well-crafted wooden puzzles with close tolerances is with specialized power woodworking machinery and suitable jigs. Until the mid-19th century, woodworking tools did not come into everyday use. So, one can conclude that most puzzle designs must not be ancient. However, few based on mathematical principles known ages ago have roots going even further back, finally fading away into the un-known or the past.

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Source:
https://dsource.in/resource/edakoodam/master-craftsmen

Master Craftsmen

Mr. Padmanabhan Aachary

Mr. Ilsung T. E.

Mr. Manoharan Aachary

Mr. Rajasekharan Parameshwaran

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Source:
https://dsource.in/resource/edakoodam/master-craftsmen/mr-padmanabhan-aachary

Mr. Padmanabhan Aachary

Mr. Padmanabhan Aachary, a successor of Perunthachan.
Place: Packham village near Periya, Kasargod district, Kerala, India.

Mr. Padmanabhan Aachary is a master carpenter and craftsman; earlier, he used to work on large-scale products. Due to an accident, he had to remain bedridden for two years. He couldn't do any tedious work. Determined, Aachary slowly moved into life and shifted his focus onto burr puzzles traditionally made in wood. Now he engages in building burr puzzles commonly called 'Edakoodam' in Kerala for a living. It is not just for fun, but it gives him new hope in life.

Aachary has crafted more than 50 puzzles till now. His craftsmanship now has a unique collection ranging from 3 blocks to 1500 blocks designs. It takes many days of effort to make a single set of puzzle sets. The new generation is unaware of such creations, which were very common in monarchy times. He is ready to sell the Edakoodam sets if an equal amount according to the hardship is offered.

There are many craft items in Aacharys' collection. Ladder turned chair; table attached seats are few among them. His four sons, Ranjith and Rajeesh, had secured third and fourth prizes in-state school work experience fair for their makes in the material. His family includes his wife Mallika and other sons Abhijith, and Abhijeesh, who extend wholehearted support for his venture.

Padmanabhan Aacharya's creations and collections.

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Padmanabhan Aacharya's new giant Edakoodam have 1500+ parts.

Padmanabhan Aacharya's new giant Edakoodam have 1500+ parts.

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Source:
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Mr. Ilsung T. E.

Mr. Ilsung T. E. belongs to the lineage of iconic carpenter Perunthachan.
Place: Thankulam Edayamkunnathu house, near Mala, Thrissur, Kerala, India.

Mr. Ilsung with his son on the right side, displayed his most giant set of Pagoda creation.

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Mr. Ilsung is a master craftsman; he learned carpentry from his father, Thankappan. He is continuing the ancient puzzle-making art as a part of his interest and passion for handicrafts. Coming from a family of carpenters, he claims that his explorations into Edakoodam began as a fascination towards one of the puzzles—that has been in his family's possession for generations. He started doing puzzles about eight years ago. After marriage, when he went to his father-in-law Sadhanandan's house, he saw a beautiful Edakoodam of eight pieces made by him. Seeing his interest, it was Sadhanandan who trained Ilsung in the craft of making Edakoodam. Later, when his son was two years, he built one using three pieces, and now that number has risen to 339. His wife also contributes to the making process by polishing the prepared parts. Apart from famous building structures such as the pagoda (Japanese crystal), many varieties of star-faced designs and right-angled notched forms are an integral part of Ilsung's collection. Three to 339 interlocking pieces and counting more than 45 variants at the moment; for this craftsman, Edakoodam is the product of his intelligence and challenge.

Ilsung works mostly for around 4-5 hours in a 20ft-by-10ft space at his house's backyard. Simple carpentry instruments and tools are used for measuring and carving the various pieces. Accuracy is essential for each of the parts to fit well. The kind of wood used for carving includes Teakwood, Jackwood, Rosewood. The natural colors in various timber give the toys their rich shades. Jackwood costs around Rs 5000/-, Teakwood costs around 7000/- and Rosewoods Rs. 10000/- per cubic foot. The largest Edakoodam he made consisted of 39 pieces which took two months for him to craft. Solving the puzzle can take up to 2.5 hours. The excess wood as a result of carving adds to the waste produced during the process. The crafted artifacts are carefully stored in suitcases and cupboards. The final products need to be transported but come with the risk of damage that can deem an entire piece redundant and require rework.

Edakoodam can be manipulated, as in the case of Rubik's cube. Handmade wooden toys are the hope in reducing the plastic toys that dominate the market these days. The Edakoodam is a tool for increasing the blood circulation in the palms as some pressure is applied to manipulate it. The puzzles come with other health benefits such as brain development in children, improving concentration, and leisure activities. The final pieces exhibit aesthetic value, and some even appear to be like optical illusions.

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Ilsung's collection and creations of Edakoodam.

Woodworking tools used for making of Edakoodam.

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Source:
https://dsource.in/resource/edakoodam/master-craftsmen/mr-manoharan-aachary

Mr. Manoharan Aachary

Mr. Manoharan Aachary
Place: Haripad, Alappuzha, Kerala, India.

A traditional carpenter and contract worker, he started making Edakoodam some ten years back. For Manoharan, making these Edakoodams' began as a coincidence. He had a friend whose father used to make these types of wooden toys and puzzles. Once on his visit to his friend's house, he had seen him doing the wooden puzzles. When he tried his hands on it, he realized that it is a challenging interlocking game consisting of notched sticks.

Mr. Manoharan has made different varieties of puzzles in different shapes and sizes. Each of the puzzles he made with extra care so that they don't lose their symmetry. That's why they never lose their interlocking properties. Observing and doing it is not that helpful. He experimented and researched a lot with these puzzles and learned more about them only when he practiced.

For this wooden puzzle maker, a puzzle is more than a passion. He is on a mission to bring these wooden playmates back to life for the future generation and to reduce the amount of plastic waste accumulated because of using plastic toys. It takes one to seven days to do a puzzle; as it is handmade, different pieces have to be made and checked for joining them for a good fit. The puzzle 'Saraswatipedom,' where one part could be divided into four, is the most difficult to create. As he mentions, it took him around seven days to complete.

Before advancing technology, children were encouraged to play with these toys made from wood, which also helped improve their concentration. There used to be a time when children in every household used to play with these Edakoodam'. An alternative to the Rubik's Cube, this wooden puzzle has properties of increasing memory and has the additional quality of being eco-friendly is once again making a comeback. Manoharan's design consists of three to 25 interlocking pieces. Currently, he is working on a new puzzle model, which will be made in a single wood piece and can be divided. Besides this, he also teaches people who want to learn puzzle making.

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Source:
https://dsource.in/resource/edakoodam/master-craftsmen/mr-rajasekharan-parameshwaran

Mr. Rajasekharan Parameshwaran

Mr. Rajasekharan Parameshwaran, Artist and Art Director.
Place: Kaliyikkavila, Kanyakumari, Tamil Nadu, India.

Mr. Parameswaran is a self-taught painter born in 1964; he is also known as Marthandam Rajasekharan. His family includes his wife Valsamma who has two daughters, who extend wholehearted support for his venture.

He has held painting exhibitions in many places, including in Singapore, Malaysia, and Britain. His first Guinness record conferred for the world's largest easel painting in 2008, The Easel, which is 56.5 feet tall and 31 feet wide, holds E M S Namboodiripad's image.

His second Guinness World Record is for the giant Devil's knot, a gigantic representation of 'Edakoodam' installed at a local resort at Kollam, Kerala, on December 27, 2017. The 'Edakoodam,' made with an iron frame, has a covering by wooden planks and weighs three tons. It was made at the cost of Rs 15 Lakhs. Each block of the giant burr puzzle is 7.3m (23' 9")- long, 0.6m (1' 9")-wide, and 0.6m-high. It broke the Devil's knot's existing record by Foffa Conrad of Valchava, Switzerland, 6-m long, 0.40-m wide, and 0.40-m high.

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Mr. Rajasekharan Parameshwaran in front of his giant Edakoodam Installation.

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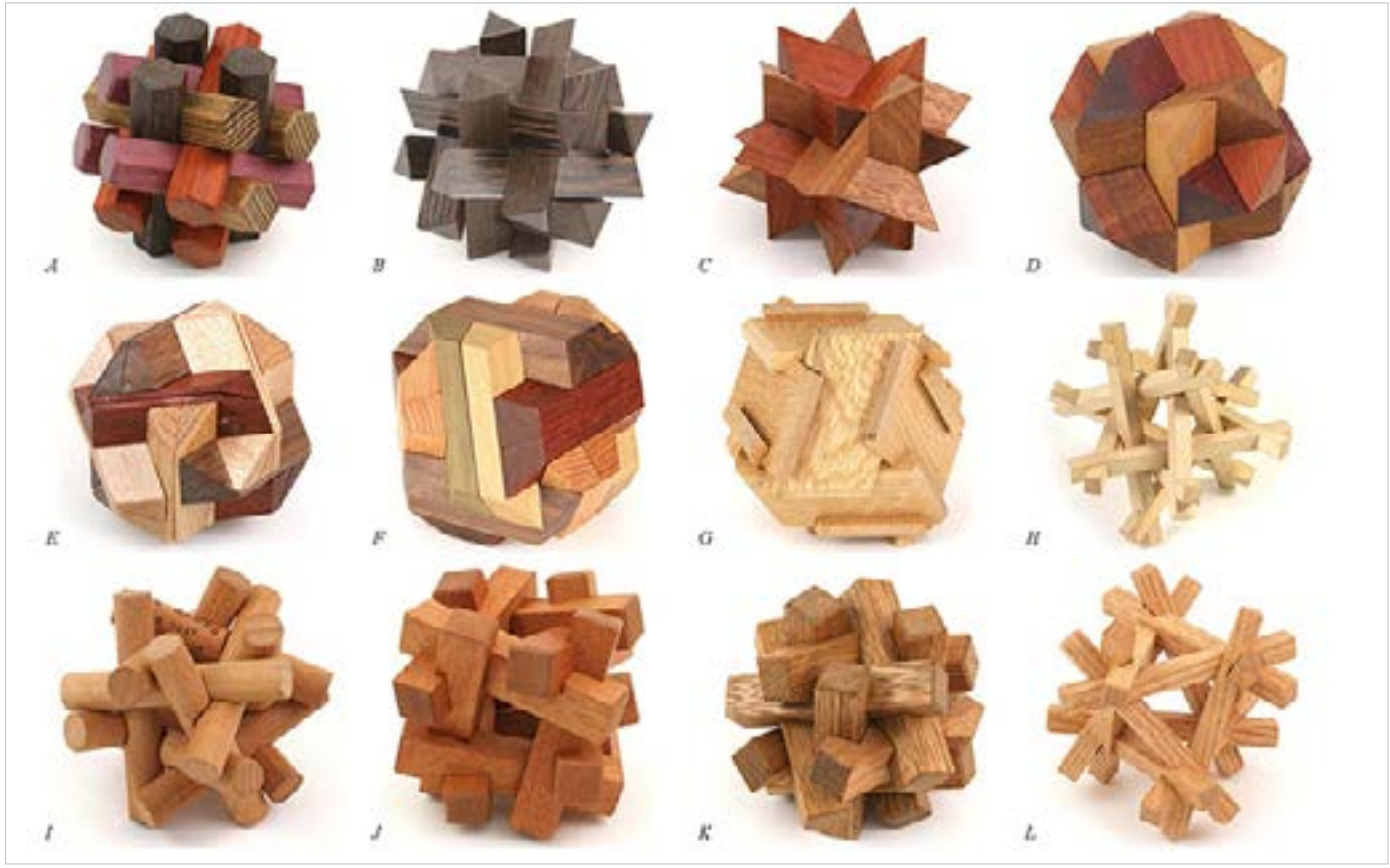
Source:
https://dsource.in/resource/edakoodam/symmetric-stick-puzzles

Symmetric Stick Puzzles

The following Images from the courtesy of Symmetric Stick Puzzles.
George W. Hart Museum of Mathematics.



Example wooden puzzles based on the symmetric placement of sticks-1
Figures A-L are based on the twelve edges of a cube,
{Extract from the George W. Hart's (Museum of Mathematics) Paper on Symmetric Stick Puzzles}

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Source:
https://dsource.in/resource/edakoodam/symmetric-stick-puzzles

Example wooden puzzles based on the symmetric placement of sticks-2
Figures M-U are based on the thirty edges of a dodecahedron, and Figure V is based on the ninety edges of a truncated icosahedron.
In W and X, the structure and its mirror image are combined, with two diameters of stick.
{Extract from the George W. Hart's (Museum of Mathematics) Paper on Symmetric Stick Puzzles}

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Source:
https://dsource.in/resource/edakoodam/early-japanese-export-puzzles

Early Japanese Export Puzzles

The following Images from the courtesy of Jerry Slocum and Rik van Grol's article 'Early Japanese Export Puzzles (the 1860s to 1960s)'.

Japanese puzzles in the 1937 Johnson Smith catalog.

Japanese puzzles in the 1937 Johnson Smith catalog.

Japanese puzzle vehicles.

Japanese puzzle trains and trolleys.

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Japanese puzzle weapons.

Japanese puzzle ships.

Japanese puzzle airplanes.

Japanese puzzle rockets.

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Source:
https://dsource.in/resource/edakoodam/early-japanese-export-puzzles

Japanese puzzle gates, towers, pagodas, and buildings.

Japanese puzzle animals.

Some charming and colorful Shackman animals and people.

Shackman's Satellite and Rocket.

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Source:
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The Tower made by Master craftsman Ninomiya.

Japanese trick bank (left) and a cigarette box with a drawer that slides out four ways (opened, right photo).

Two old Japanese banks with hidden coin slots (opened, right photo).

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Three German interlocking puzzles: an apple, a barrel, and a pear.

A boat puzzle bank (left) and a water mill puzzle bank (right).

Source:
https://dsource.in/resource/edakoodam/early-japanese-export-puzzles

Typical Japanese puzzle boxes from the 1930s to the 1990s.

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Source:
https://dsource.in/resource/edakoodam/acknowledgements

Acknowledgements

I would like to thank Mr. Ilsung for the kind cooperation and interview held in Feb 2020 at his residence and for the photographs during his primary studies at his home in Mala. I also thank him for his timely response over the telephonic messages and conversations about the doubts and clarification on facts. I thank Ms. Stuti P and Mr. Arun T. B for their assistance with the images and information. I would also thank all the Authors and writers who have written on various relevant topics, which immensely helped in this compilation. I sincerely appreciate my friends and colleagues for the feedback. Finally, I extend my gratitude to Ms. Suvidha P for her visuals and field-work support.

- Prof. Arun Mascarenhas

Prof. Arun Mascarenhas is a trained Sculptor and an academician by profession. He started his professional career as a 'Handmade Toy Designer' in 2009 at Iseo Chemdis Pvt. Ltd, Gurugram, India. He was visiting faculty in the Dept. of Sculpture, College of Art, New Delhi, for a brief period, before being taken to practice teaching full time. Since then, he has served in different capacities at Kendriya Vidyalaya Sangathan, National Institute of Fashion Technology, and Indian Institute of Technology Hyderabad before joining IDC School of Design at IIT Bombay in 2018. Currently, he is designated as an Assistant Professor in Communication Design. Prof. Arun co-co-ordinates the 'Foundational Studies' and 'Drawing Community' at IDC School of Design.

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The documentation on Edakoodam is done by Prof. Arun Mascarenhas. The word 'Edakoodam' is familiar to most Malayalam-speaking folks in southern India, which means 'a puzzle that is difficult to solve' or 'to do something thoughtlessly.'

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Links

Books and Articles

• https://johnrausch.com/PuzzleWorld/books/books.htm

• https://johnrausch.com/PuzzleWorld/art/articles.htm

• Ariel Hanaor, "Tensegrity: Theory and Application," in Gabriel, Beyond the Cube, 1997.

• Schoen, and Tom Rodgers, A.K. Peters, 2009, pp. 187-210

• Jerry Slocum and Jack Botermans, Puzzles Old and New, Plenary Publications, 1986

• Early Japanese Export Puzzles 1860s to 1960s by Jerry Slocum and Rik van Grol

Puzzle Designers and Craftsmen

• https://johnrausch.com/PuzzleWorld/des/desncrft.htm

Puzzle Categories and International References

• https://johnrausch.com/PuzzleWorld/cat/category.htm

• https://www.puzzlemuseum.com/index.html

• https://chinesepuzzles.org

• https://momath.org/mathmonday/

• https://www.puzzlewarehouse.com/history-of-puzzles/

• https://archive.org/details/puzzlesoldnew00hoff/page/n2/mode/1up?q=1

• https://johnrausch.com/PuzzlingWorld/default.htm

• https://johnrausch.com/PuzzleWorld/msc/miscellaneous.htm

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Source:
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- http://www.georgehart.com
- https://web.archive.org/web/20130805045721/http://www.pentangle-puzzles.co.uk/acatalog/WoodChuck_Puzzles.html
- Nick Baxter, web auction, http://puzzles.baxterweb.com/
- Indiana University, Slocum Collection, http://www.indiana.edu/~liblilly/overview/puzzles.shtml
- Mathematica, http://www.wolfram.com
- https://www.youtube.com/watch?v=o7LmHDQZ4jg
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- https://youtu.be/35rFxtXwUz0
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Source:
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Video

Edakoodam - Animation

Edakoodam - Ilsung Son Demonstration

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