

Shikshana Prasarak Mandali's
Sir Parashurambhau College, Pune
(Autonomous)



INDIAN KNOWLEDGE
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Sir Parashurambhau College 2023



**Shikshana Prasarak Mandali's
SIR PARASHURAMBHAU COLLEGE, PUNE - 30.
(Autonomous)**

CALYX

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A Study Circle Activity

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Foreword

It gives me immense pleasure to present the 14th issue of the Students' Magazine Calyx in the centenary year of S.P.College.

Calyx is a magazine brought out wholly by the students of the Study Circle group. This platform gives young minds an opportunity to think out of the box, go beyond the syllabus and enhance their creative thinking and research abilities. I am sure that the students enjoy this academic space and freedom and it helps them to explore their capacities beyond classroom teaching and examination curriculum.

In this year of college, Calyx focuses on Indian Knowledge System and The Influence of Arts in Human Life. The undergraduate and postgraduate students from English, Philosophy, Statistics, Microbiology and other departments have written articles on the said theme. The students have taken all the efforts to survey literature and have expressed their views while writing these articles. All the work related to Calyx from selecting the theme to editing the articles was completed by the members of the group and they have worked to the best of their capacities. I would like to appreciate the efforts and contribution by all the study group members, especially the editors of the magazine Chinmayee and Rakesh Deshpande. Their dedication, devotion, motivation and commitment definitely deserve a special mention. I wish all the success to the members of the study circle group.

The articles are well researched and point to the efforts taken by the students in writing them. The students have included a wide range of subjects like usage of arts in the New Education Policy, History and Roots of Biotechnology, Forrest Gump, etc.

There have been major breakthroughs, innovations and developments in the world and in India in the last hundred years. Today in an age where dual-careers and study across disciplines have gained prominence, the scope of interdisciplinary studies is huge. No more are one directional approaches adequate to tackle some of the biggest challenges the world faces and there is need for multi-pronged approaches, often involving multiple streams of study and research. The articles in

this magazine very well demonstrate these developments. I am sure that our readers will enjoy them.

I also take this opportunity to thank our Principal Dr. Sunil Gaikwad for his continuous support and encouragement for this extracurricular activity and for assisting the students in exploring their potentials beyond the expected. I extend my sincere thanks to the librarian Mrs. Pratibha Sakhare for allowing the students an unfettered access to the library for writing their articles. I also thank our teaching and non teaching staff for their help.

Special thanks are due to Mr. Avinash Kakade, our printing incharge, for his help and valuable suggestions in bringing out this issue.

**Dr. Sucheta Gaikwad
(In Charge, Calyx)**

Editorial

It is with great pleasure that we present to you the 14th edition of the Calyx magazine. The theme explores the Indian Knowledge System, History and Roots of Subjects and the Influence of Arts in Human Life. The Indian Knowledge System (IKS) is an innovative cell under the Ministry of Education (MoE) at AICTE Delhi. It is established to promote interdisciplinary research on all aspects of IKS, preserve and disseminate IKS for further research and social application.

The Influence of Arts in Human Life is a major aspect for everyone, and arts have become an intrinsic part of every human's life and the magazine sheds light on just a few of those aspects through the research conducted by the students of S.P. College.

The articles in this magazine have been written by students of the English, Philosophy, Statistics, Microbiology and other departments as they have tried to explore the topic in varying amounts of detail. The venture is a Students Study Circle Activity, a place which acts as a platform for students from various faculties to come together and discuss the work going on in their respective subjects. This venture tries to be as authentic as possible in the portrayal of their thoughts and opinions while adhering to the theme of the magazine. Research regarding the background of these articles consists mainly of secondary sources, so we request the readers to take that into consideration with regard to any errors that they may notice. We are open to feedback and suggestions of all kinds as we hope to improve upon ourselves in the future.

We hope this magazine proves to be an interesting, entertaining as well as an educational reading experience.

Yours Sincerely,
Chinmayee Bhate (editor)
Rakesh Deshpande (co-editor)

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Influences of Art on Human Life: Importance of Arts in the Teaching-Learning Process

The arts are a very wide range of human practices of creative expression, storytelling and cultural participation. They encompass multiple diverse and plural modes of thinking, doing and being, in an extremely broad range of media. Both highly dynamic and a characteristically constant feature of human life, they have developed into innovative, stylized and sometimes intricate forms. This is often achieved through sustained and deliberate study, training and/or theorizing within a particular tradition, across generations and even between civilizations. The arts are a vehicle through which human beings cultivate distinct social, cultural and individual identities, while transmitting values, impressions, judgments, ideas, visions, spiritual meanings, patterns of life and experiences across time and space.

According to the Merriam-Webster, the arts are painting, sculpture, music, theater, literature, etc., considered as a group of activities done by people with skill and imagination. Each of these varied forms of arts have a role of their own in human life, a peculiar influence on human surroundings, and an influence in every aspect of life. What follows the pursuit of arts leads to findings that are magical in their own self, influential in nature and a perspective towards living and life unbeknownst previously.

The arts are a vast ocean of opportunities, deep and mystical, and a single dive into its ever expanding, all encompassing beauty leaves the wanderer wonderstruck. Like the ocean completes the Earth, art completes life... after all, the Earth without art is just 'eh'.

From this ocean, let's fetch out a pearl everyone is familiar with, an area of life that everyone is entitled to, perhaps the most influential aspect of one's life, education. Education is by far the largest influence on one's life, and where better to use the artistry than in the teaching learning process? This article focuses on the influence of arts on the teaching-learning process and its psychological importance, with a focus on toy-based learning, storytelling and music.

Arts are very prominently used in art therapy in psychology. Children often find it difficult to express themselves through the means of language, and the use of various arts, such as craft work, role-play, a CBT technique called empty-chair, are used to help children, and even adults, to express themselves sufficiently. Art becomes a tool for children, teens and adults alike to express themselves, through the means of musical performances, paintings, etc. They let these arts speak for them when words fail. Arts also help people to vent out their emotions, it helps them understand their own emotions.

Mental health is sort of a taboo in our society and people still feel awkward to express themselves openly, which leads to them not understanding their own feelings or emotions; here, art comes into play as it helps people to see their underlying or suppressed emotions.

Art is an experience, without which life will be plain, almost dull. Arts add color to the monotony of life, make it worth living. A metaphorical example on how arts influence life is, if one were to watch a horror movie and turn off the sound effects of it, the experience will be incomplete, the jumpscare not effective, it would essentially be a boring movie. Similarly, arts add that special effect to life that makes it more effective, more colorful, full of experiences. Arts bring people together, it binds people, brings harmony among people.

NEP (New Education Policy), has guidelines to use art-integrated teaching methods. These methods include toy pedagogy, which makes the use of toys such as puppets and sports pedagogy, which uses sports for educational purposes as well as inclusion of sports in the curriculum.

Jean Piaget, the Swiss psychologist, who is credited with founding the scientific study of children's thinking theory, has highlighted the importance of learning through playing. Playing with clay dough, balls or other such toys help children learn faster and better and also helps them develop physically, emotionally as well as socially.

पु.ल. देशपांडेंनी जे म्हणून ठेवलयं की आपण जी नोकरी करतो ती जगण्यासाठी, पण जगायचं कस आणि का ते कलेतुनच शिकता येतं.

Storytelling is one of the art forms that is much loved and much used in the classrooms. Narratives take the form of folktales, legends, myths and religious stories and are often used to teach moral lessons, entertain and teach history. Jack Zipes is a prominent scholar in the field of storytelling and children's literature. He has written extensively on the cultural and pedagogical significance of fairy tales and storytelling in contemporary society. In the context of Indian classrooms, Zipes' ideas hold particular relevance as they emphasize the importance of recognising the value of everyday storytelling as a pedagogical tool. Zipes argues that storytelling can play a crucial role in fostering critical thinking, empathy, and a deeper connection with the subject matter being taught.

Students learn better when what they're learning is presented in the form of stories. It takes an interesting turn than the regular lessons and helps them remember better. Our brain, we know, has two halves, the right and the left. Neurologically proven, the right brain retains more information and has a larger memory space, and these art forms engage the right brain as opposed to the logical left brain. Which is one of the reasons why CBSE (Central Board of Secondary Education) is focusing more on the integration of art in pedagogy.

Another of the major, and perhaps one of the most famous forms of art is music. The importance of music, in its simplest form, is to elevate our emotions. Whether we are feeling sad, or happy or stressed, it rarely ever happens that our thoughts don't immediately end up on our favorite playlist. Pretty sure, most of the people even have different curated playlists for a different set of moods. Music helps people relax, it helps us calm down, get back in our reigns.

One of the major influences music has on life is a person's growth. With what in Indian Classical Music is called " रि याज्ञ / रि याज", the act of practicing your art, especially music, everyday at a set time, leads to a person's growth and improvement. It helps a person realize their goal and strive to achieve it. It builds strength and character. Music is like meditation. There are no set boundaries to your achievement, the more you push, the further you reach, and each new attempt is just as, if not more, satisfying in itself.

Music also has a pedagogical importance, where if the curriculum introduces music to the students, it not only helps relax and rejuvenate the students minds, but also helps in building concentration. The best example of this is when a poem is given a tune, it becomes easier to learn and remember. It appeals to the right brain and retains the information, in a fun way. Not only poems, but even other areas of the curriculum can benefit from the use of music or rhythm.

Arts have been an integral part of human culture from the beginning of human civilization, right from cave paintings to the modern day understanding we have of arts. Art is something we cannot separate from our life. The inclusion of arts in education and the teaching-learning process is an important part of a child's overall development and hence integral to its inclusion in pedagogy. With so many various forms of arts available at the disposal of teachers, it's not a huge task to have this inclusion. On some level, some teachers already use some of the artistic techniques in teaching and it's time these are recognized and reinforced.

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Chinmayee Bhate (TYBA English)

Forrest Gump and Me

If you were asked which is the youngest art, what would you answer? A lot of evidence has been found that all the currently known arts existed in ancient times as well. However, there are some arts that exist today that originated only around 100 years ago. One such young art is filmmaking. It would not be an exaggeration to name filmmaking as one of the most influential arts in human life. Not only this, but when we think about who influences children, along with parents, friends, family, society, television is also mentioned.

I think readers would like to hear how my life has changed due to the influence of a movie under the topic 'Influence of Art on Human Life'. That movie is Forrest Gump.

Forrest Gump

I had watched the movie 'Forrest Gump' a long time ago. Being a fan of movies, I never watch movies on the surface. So I have been in the habit of analyzing all aspects of film since childhood. We can say that this film, starring Tom Hanks, is a fictional biopic. This is the story of a low-IQ boy named Forrest Gump. The boy lives with his mother. And the film shows what happens to him from childhood and what he becomes when he grows up. But..

What are they trying to say?

I didn't understand it when I first watched this movie. Any medium of storytelling is chosen only when the storyteller wants to say something of his own. (In the language of filmmaking, this is called the premise of the film.) No story is ever just for entertainment. Or entertainment is never the main purpose of the story. No matter how great the movie Forrest Gump is, I didn't understand what the storyteller meant when I first saw it. It was understood that the movie is definitely not bad. Or it was understood that the storyteller did not write the story for purely entertainment purposes and the director also made the film with a thought in mind. But what does the storyteller have to say? What is the director trying to convey? This, however, was not understood. I watched this movie many times to find out. But I did not understand what he was saying.

Eureka!

One day in my college days, I was watching this movie. During that time I was very fond of storing quotes of famous people. In one scene from the film, Forrest Gump is called for an interview on a TV show. In addition to him, another person will also be interviewed in this program. Forrest Gump comes to that event and sits next to that person. That person is John Lennon. John Lennon, founder of the famous music band Beatles. I had seen this scene many times before. But today it occurred to me, what was the reason for taking John Lennon into this scene? And yet he was only in this one scene. Which had nothing to do with moving the story forward. So why did the director take him in? For what purpose would he have taken John Lennon in this scene? Stopping the movie I started thinking about it and suddenly out of nowhere I remembered a quote from JohnLennon.



“What is life? Life is what happens to you while you are busy making other plans.” - John Lennon.

And in an instant I realized what the storytellerm meant. This is what the storyteller has to say. No plan is the plan

We are all constantly planning what should happen in our lives. Everything is planned from birth to retirement. We always want to plan whatcareer to pursue, what kind of person to marry,

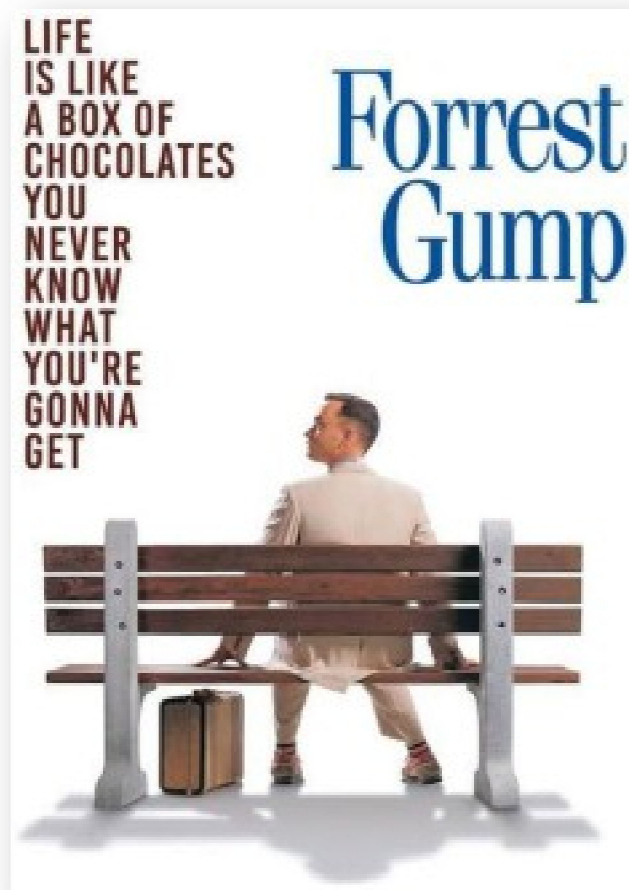
where to go for a trip, what kind of people to make friends with, what cityor country to live in, what age to retire and what to do after retirement. But we never think about what will happen if we accept things that come in life without planning anything. Why don't you accept the career that will come your way, make friends with the people who will come your way?

Often we want something special out of life. But often life is determined to give us something different. That's why life often creates obstacles in our way of getting what we want. Because life has different plans for us. So life pulls us back.

What if instead of living life with a plan, we just accept what comes our way? So life also gives us abundance. And that's what Forrest Gump's storyteller says.

Life is like a Chocolate Box

As a child, Forrest was told by his mother that life is like a box of chocolates. No one can tell who gets what chocolate. Indirectly, she teaches him that do we try to get some particular chocolate from the chocolate box? Or is it worth the effort? You have no choice but to accept the chocolate that has come your way. But.. No matter what chocolate comes your way, in the end it is 'Chocolate'. And everyone always loves chocolate. In short, whatever life gives us, it is exactly what we want. Because spirituality says that we do not know exactly what we want in life. But that's exactly what life knows.



Run Forrest Run

Forrest always remembers this teaching of his mother. And always decides to act accordingly. That is, he decides to accept whatever comes his way in life like a chocolate. As a kid, he was bullied by other kids his age. Then his girl friend tells him that if the boys come to bully you, you should start running away from there. At such a time, Forrest does not think that running away is a sign of cowardice. He accepts this and starts running away when someone comes to harass him.

Even though Forrest's schooling is over, he is still running away from bullying children. Once he runs like this, he reaches the grounds of a well-known college.



That's where a rugby match is going on. Forrest runs faster than those players. The college rugby coach sees him running. Then what! Because of his fast pace, Forrest is admitted to that college, with the intention of joining the rugby team. Forrest accepts it. College education ends, and on convocation day, a man arrives and puts a pamphlet in Forrest's hand. It has an advertisement for recruitment in the

Army. Forrest also accepts it. And gets recruited into the Army.

Then there he befriended a boy like him. This friend asks him if he is interested in fishing business with him when he leaves the army. Forrest immediately says 'Okay' to him too.

Even after this, many things happen in Forrest's life and he also accepts everything. Thus Forrest accepts everything that comes in life. Forrest accepts every offer made by life. And by the end of the movie, the less intelligent Forrest Gump has become a world famous person.

Girl with a Goal

Forrest's girl friend, on the other hand, who advised him to run away as a child (indirectly, keep running forever), had dreamed of growing up and becoming a successful singer. And she is ready to do anything to achieve this goal. But this girl's life becomes turmoil. She starts living with hippies. There is a time when she sings naked in a men's club. And the drunken men there are grabbing her. Once Forrest himself punches such a man, as he tries to grab her.

Premise

This is what the storyteller of this film is trying to say. If you accept everything that comes in life, then life also enriches you. Life also gives us exactly what we want. As I said before, you often don't even know what you want. We are setting a goal out of misunderstanding and pursuing it. And that's why most of the time even after achieving your goal, you don't enjoy the happiness of perfection. But as we continue to accept what life offers, there comes a time when we begin to experience perfection. Because your life knows exactly what you want.

Do successful people set goals? Or do they say Yes to life?

Finally, I understood what the writer and director wanted to say through this movie. But still the mind was not ready to accept. How is it possible to just accept what life has to offer without setting any goals? Because after all we are taught from childhood that every human being should have some goal in life, life without a goal is meaningless, etc. Then suddenly how to accept such opposite thoughts?

But after many days this whole topic kept repeating itself in my mind, finally I decided to verify what is said in this movie with real life. Are there really such people in this world?

And the answer is yes, only people who say yes to life are successful and running the world today. There are many people in the world who have said yes to life and their life has enriched them. We look at a successful person and decide to become



like that person. But do we ever think that this has a person achieved this success by deciding or life has given him/her all this? Let's look at an example.

Do you really think that Mark Zuckerberg dreamed of creating a social networking site like Facebook? Mark could not dream of such a thing because social media or social networking did not exist before him. It would not be an exaggeration to say that he has pursued a career in a field that did not exist before. We all know the story behind Facebook today. Mark had created a site for fun while still in college. Even then, he had no plans to expand the site. But then he got the opportunity to make that site bigger and he accepted every opportunity. That is, life offered him something and he accepted it. And today the names of both Facebook and Mark are known all over the world.

It is said that Steve Jobs was Mark Zuckerberg's mentor. And Steve Jobs himself has been on a spiritual path all his life. Steve Jobs began to take an interest in spirituality at an early age. Not only that, he also left all his work and came to Nim Karoli Baba's Ashram in India in search of a Guru. Unfortunately, Nim Karoli Baba had already passed away and Steve could not visit him. So Steve had to go back



without getting a Guru. And then he got a guru right where he lived. But the Guru told him to return to work while doing spirituality. And then Apple was born. It is said that Mark went to see Steve in his last few days. At that time, Steve had also advised Mark to go to India. And Mark had also implemented his advice. This could mean that Mark was already on a spiritual path. And maybe that's why Mark had the sense to say yes to life and accept what life has to offer.

When Bill Gates entered the list of the richest people in the world, he was also asked what the secret of your success is. He replied, "Luck." Why didn't he say that it was my dream or I had set this goal and I worked hard to achieve it? Maybe the reason behind this is that he didn't really set this goal. He just kept saying yes to life.

Jim Carrey also has a film on the same subject. 'Yes Man'.

And Me..

But when after much thought on the subject, these thoughts dawned on me, I too decided to live by this line of thinking. Which took many years. And after many years, yes, there came a time in my life that I decided to live my life according to these thoughts. I wasn't a college kid anymore, many years had passed since the end of education. As I was not a boy who would make much progress in education, the job was also not for me. And suddenly one day I got a business offer from a good person. Suddenly quitting your job at the age of 29 to start a business is risky and logically unwise. However, I had to say yes to life now as I decided. I accepted this business offer. And lo and behold, within the next 5 years, my business was doing brilliantly.

I have been interested in spirituality for a long time. As a hobby I have read many books on this subject at a very young age. Also, I myself am very fond of meditation. And teaches others too. Later I also started giving lectures on meditation in many yoga academies. At that time, many people used to ask me, Why don't you do anything in this subject? I also wanted to do more work in this subject which was not being fulfilled because of the job. But now that I have settled down in business, some people have reminded me of this again.

Ph.D.!

I wanted to work in spirituality from now on. I felt that my knowledge in this subject should be used somewhere. But I had no idea what to do. At that time someone suggested that you should do a Ph.D. in this subject. The first thing that came to my mind was whether it is possible for a boy like me who scored very low marks in school and college to do a Ph.D. But then I remembered that I have decided to accept every offer in life. Also, now that I am well settled in business, I can manage both my business and Ph.D. work. And since I needed a Master's for my Ph.D., I also took admission in S.P. College for M.A. Philosophy. And now I am studying for my Masters with great interest and pleasure.

I have no idea what will happen next. But if I hadn't accepted that business offer then, would my life be the way it is today? Spirituality was never my purpose in leaving my job and starting a business. Have I ever thought in life of doing a Ph.D. in Spirituality? So should I say that because I accepted life's offer, life also gave me what I wanted? Where did I get the strength to quit my job and start a business at such an age?

Don't know. Perhaps this is the result of the influence this film had on me.

In short, be it Forrest Gump or Mark Zuckerberg or Bill Gates or me. We said yes to life and then life said yes to us. And that's why I consider the movie Forrest Gump a spiritual movie.

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Rakesh Deshpande (M.A.-I Philosophy)

The Great Indian Mathematician : BHASKARA II

Turning our attention to the history of algebra, the name of Bhaskara II of the twelfth century stands before us ! He was the leading mathematician of that time, who wrote the first work with full and systematic use of the decimal number system.

Siddhānta Shiromani (सिद्धांतशिरोमणी) is his main work. It is found that he mentioned his date of birth. He was born in 1114. Bhaskaracharya's name was actually 'Bhaskara' only, but the title 'Acharya' was added to mean 'Bhaskara The Teacher'. He is also known as Bhaskara II to avoid confusion between Bhaskar I. He is the only ancient mathematician who has been immortalized on a monument.

Bhaskara II was Born in a Hindu family of scholars, mathematicians and astronomers. It is said that he was the leader of a cosmic observatory at Ujjain, the main mathematical center of ancient India. Bhaskara and his works represent a significant contribution to mathematical and astronomical knowledge in the 12th century. He has been called the greatest mathematician of medieval India. His main work *Siddhānta-Śiromaṇi*, (Sanskrit for "Crown of Treatises") is divided into four parts called *Līlāvātī*, *Bījagaṇita*, *Grahagaṇita* and *Golādhyāya*, which are also sometimes considered four independent works. These four sections deal with arithmetic, algebra, mathematics of the planets, and spheres respectively. He also wrote another treatise named *Karāṇā Kautūhala*.

(The cover of Siddhanta Shiromani's book is attached with the document.)

1. **LILAVATI** : The first section *Līlāvātī* (also known as *pāigaṇita* or *aṅkagaṇita*) consists of 277 verses. It covers calculations, progressions, measurement, permutations, and other related topics. *Lilavati* was the standard textbook of Algebra for many students. The text *Lilavati* of Bhaskaracharya is an excellent example of how to study math !

Bhaskaracharya's conclusion to *Lilavati* states:

Joy and happiness is indeed ever increasing in this world for those who have *Lilavati* clasped to their throats, decorated as the members are with neat reduction of fractions, multiplication and involution, pure and perfect as are the solutions, and tasteful as is the speech which is exemplified.

2. **BIJAGANITA** : One reference says that, the second section *Bījagaṇita* (Algebra) has 213 verses another reference which is a translation book has 187 shlokas included in it. The text discusses zero, infinity, positive and negative numbers, and indeterminate equations including (the now called) Pell's equation, solving it using a *kuṭṭaka* method. In particular, he also solved the $61x^2+1=y^2$ case that was difficult for Fermat and his European colleague centuries later. In *Bījaganita*, Bhaskara mentioned infinity as *Khahara* and operations on infinity in the view of God which he mentions as *Achyuta*.

3. **GRAHAGANITA** : It contains sine tables and various trigonometric relations. It consists of 451 verses. He arrived at the approximation : $\sin y' - \sin y \sim (y' - y)\cos y$ for y' close to y , or in modern notation : $d(\sin y)/dy = \cos y$. In his words: *bimbārdhasya koṭijyā guṇastriyāhārah phalaṃ dorjyāyantaram*
4. **GOLADHYAY** : This text deals with the study of spheres and spherical objects. References say that astronomical information is given in this book.

Some of Bhaskara's contributions to mathematics :

- In Lilavati, solutions of quadratic, cubic and quartic indeterminate equations are explained.
- Solutions of indeterminate quadratic equations (of the type $ax^2 + b = y^2$).
- Integer solutions of linear and quadratic indeterminate equations (Kuṭṭaka). The rules he gives are (in effect) the same as those given by the Renaissance European mathematicians of the 17th century.
- A cyclic Chakravala method for solving indeterminate equations of the form $ax^2 + bx + c = y$. The solution to this equation was traditionally attributed to William Brouncker in 1657, though his method was more difficult than the chakravala method.
- The first general method for finding the solutions of the problem $x^2 - ny^2 = 1$ (so-called "Pell's equation") was given by Bhaskara II.
- Solutions of Diophantine equations of the second order, such as $61x^2 + 1 = y^2$. This very equation was posed as a problem in 1657 by the French mathematician Pierre de Fermat, but its solution was unknown in Europe until the time of Euler in the 18th century.
- Conceived differential calculus, after discovering an approximation of the derivative and differential coefficient.
- Stated Rolle's theorem, a special case of one of the most important theorems in analysis, the mean value theorem. Traces of the general mean value theorem are also found in his works.

Trigonometry

The Siddhānta Shiromani (written in 1150) demonstrates Bhaskara's knowledge of trigonometry, including the sine table and relationships between different trigonometric functions.

He also developed spherical trigonometry, along with other interesting trigonometrical results. In particular Bhaskara seemed more interested in trigonometry for its own sake than his predecessors who saw it only as a tool for calculation. Among the many interesting results given by Bhaskara, results found in his works include computation of sines of angles of 18 and 36 degrees, and the now well known formulae for $\sin(a+b)$ and $\sin(a-b)$.

Calculus

His work, the Siddhānta Shiromani, is an astronomical treatise and contains many theories. Preliminary concepts of infinitesimal calculus and mathematical analysis, along with a number of results in trigonometry, differential calculus and integral calculus that are found in the work are of particular interest.

Bhaskara also goes deeper into the 'differential calculus' and suggests the differential coefficient vanishes at an extremum value of the function, indicating knowledge of the concept of 'infinitesimals'.

There is evidence of an early form of Rolle's theorem in his work. (Modern formulation of Rolle's theorem states that $f(a) = f(b) = 0$ then, $f'(x) = 0$, for some x with $a < x < b$)

He gave the result that if $x \sim y$ then $\sin(y) - \sin(x) \sim (y-x)\cos(y)$, thereby finding the derivative of sine, although he never developed the notion of derivatives

He also showed that when a planet is at its farthest from the earth, or at its closest, the equation of the center (measure of how far a planet is from the position in which it is predicted to be, by assuming it is to move uniformly) vanishes. He therefore concluded that for some intermediate position the differential of the equation of the center is equal to zero. In this result, there are traces of the general mean value theorem, one of the most important theorems in analysis, which today is usually derived from Rolle's theorem. The mean value theorem was later found by Parameshvara in the 15th century in the Lilavati Bhasya, a commentary on Bhaskara's Lilavati.

Bhaskaracharya's saying about algebra which he had given in text Bijaganita is

जले तैलं खले गुह्यं पात्रे दानमनागपि
प्राज्ञे शास्त्रं स्वयं याति विस्तारं वस्तुशक्तीतः ॥ (From Lilavati)

Marathi meaning : पाण्यामध्ये तेलाचा एक थेंब टाकला असता तो पसरतो, खलाचे ठिकाणी गुह्य गोष्ट व सत्पात्रे दान विस्तार पावते तसेच प्रज्ञाच्या ठिकाणी शास्त्र हे वस्तू शक्तीनेच पसरते म्हणजे आचार्यांची इच्छा हीच की हे शास्त्र सुयोग्य शिष्याला द्यावे.

(From reference 5)

Hope we all have got lessons from this article. Knowing Bhaskaracharya introduces one to Ganita in spiritual perspective also. It can be seen that earlier there was no special subject named as *ganita* or mathematics. Ancient Indian people used math as a tool for solving our day today problems like area of yajna kunda, counting number of cows etc. Still they knew the concepts of eclipse, revolution of earth etc. Later, a separate branch of Mathematics was developed and it is still developing ! Hope we all youth get inspired from the mathematicians like Bhaskaracharya and gain the prosperous knowledge our ancient vedas have ! A special tribute to such a great mathematician !!

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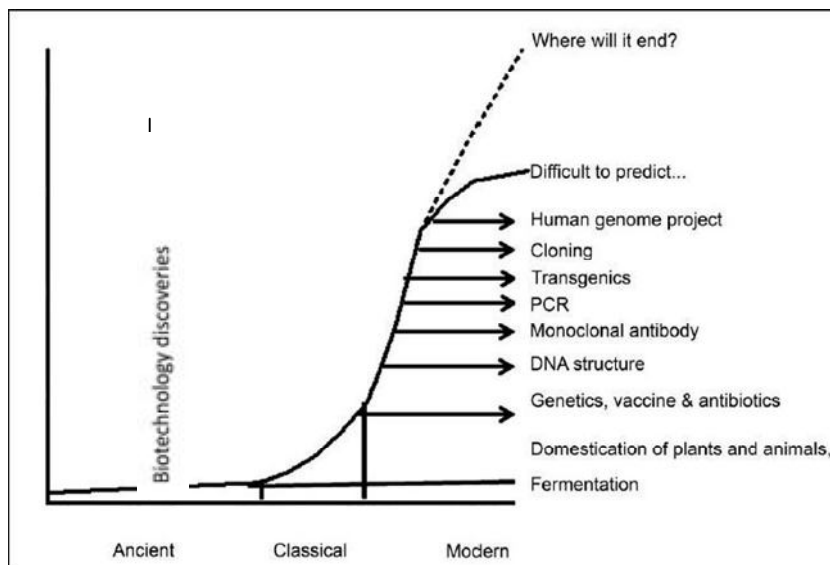
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“Biotechnology: A Historical Journey from Ancient Observation to Modern Breakthroughs”

“Biotechnology”, a word you can find in daily papers. Covid will go down in human history, so will the word. From vaccines to food, biotechnology has touched every aspect of our lives. Biotechnology is derived from two simple scientific words, namely “Biology” and “Technology”. If we break the word down, it simply refers to the technology that uses natural resources to create products that improve people’s lives.

It is generally known that Hungarian scientist K. Ereky first used the word “Biotechnology” in his 1919 book “Biotechnology for meat, oil and milk production in Agriculture”. People were interested in biology because of its relationship with nature and attitude to scientific observation. But this is not the start of biotechnology. The complexity of biotechnology is increasing over time due to the development of new technologies based on the application of advanced technology and a better understanding of the various principles of life sciences. If we carefully examine the development of biotechnology up to the current stage, it can be divided into 3 phases: 1) Ancient Biotechnology, 2) Classical Biotechnology, and 3) Modern Biotechnology. Some important discoveries related to biotechnology are shown below



History of development of biotechnology.

Some of the important biotechnology discoveries have been plotted in this graph, with a possibility for its unlimited growth in the future.

Ancient Biotechnology

Ancient biotechnology before 1800 was characterized by numerous discoveries and developments that stemmed from common observations about nature.

Although its types and origins vary, nutrition, clothing and shelter have been basic human needs throughout the ages. Ancient people ate raw meat when they encountered a dead animal. However, the scarcity of food during harsh weather conditions drove them to domesticate food sources, leading to the emergence of agriculture. In ancient times, people began to explore the possibility of growing food near their homes for easier access. They obtained seeds, mainly grains, and planted them near their settlements. By understanding the importance of water, light and other needs, they optimized the growth of food plants and agriculture. Likewise, these various principles and needs resulted in domestication of wildlife that improved living conditions and provided sustainable food without the risk of hunting. This domestication marks the beginning of animal breeding, opening up space for observation, influence, and use.

Undoubtedly, this period represents the first stage of agricultural evolution that later led to the development of food preservation and storage. People have used cold caves to store food for a long time, and the evolution of containers like leather bags and earthenware has enabled safe food storage. With the cultivation of crops and domestication of animals, people began to explore other discoveries such as cheese and curd. In particular, cheese can be considered as one of the first direct products or by-products of biotechnology. One possible method of cheese making (although this understanding didn't exist at the time) involved adding rennet, an enzyme found in the cow's stomach, to sour milk. Yeast is one of the oldest exploited organisms which play an important role in bread-making, vinegar production and other fermentation processes, including wine and beer making. The discoveries and advantages stemming from these observations motivated people to further refine these processes.

Classical Biotechnology

Classical Biotechnology marks the second phase of change and development of the field, from 1800 to the mid-20th century. During this time, many scientific discoveries appeared that contributed to the solution of complex biotechnological problems. Everyone's contribution played an important role in uncovering this mystery and paving the way for new discoveries. At the heart of biotechnology lies the transmission of genetic information that was first deciphered in plants, specifically *Pisum sativum*, also called the pea plant. Gregor John Mendel, an Austrian Augustinian monk, made these observations. Mendel presented the "Laws of Inheritance" to the Natural Sciences Society in Brunn, Austria, where he proposed that internal units of information, later called genes, account for observable traits that are transmitted from one generation to the next.

Unfortunately, Mendel's discoveries were not given the credit they deserved until about 34 years after his death, when other scientists such as Hugo de Vries, Erich Von Tschermak, and Carl Correns validated his work in 1900. Mendel's work went

unnoticed for a long time, mainly because it was overshadowed by Charles Darwin's Theory of Evolution. Meanwhile in England, Dr. Alexander Fleming made a groundbreaking discovery in antibiotics. He discovered that one microbe could be used to kill another, exemplifying the divide and conquer concept. Fleming pointed out that when mold grows in a petri dish, all bacteria die. Fleming himself wrote, "When I woke up just after dawn on September 28, 1928, I certainly didn't plan to revolutionize all medicine by discovering the world's first antibiotic or bacteria killer."

Modern Biotechnology

During World War II, scientific discoveries faced a major crisis. But after the war came the great breakthrough that determined modern biotechnology and its current status. In 1953, JD Watson and FHC Crick unveiled the "Double Helix Model of DNA," providing a structural understanding of DNA as a genetic material. This model explained various phenomena related to DNA replication and inheritance.

Later, in 1961, Jacob and Monod introduced the concept of the Operon, while in 1975, Kohler and Milestein developed cytoplasmic hybridization and produced the first monoclonal antibodies, revolutionizing diagnostics. Now the scientific community seems to have acquired the necessary tools and quickly found the importance of science by clarifying many of the key concepts. Dr. Hargobind Khorana synthesized DNA in a test tube, and Karl Mullis amplified DNA in a test tube, greatly increasing its quantity. This technological advancement enabled scientists to insert foreign DNA into other organisms and monitor its transfer to subsequent generations. The emergence of HIV/AIDS as a deadly disease significantly improved tools used by life scientists in various aspects of everyday life.

Additionally, Ian Wilmut successfully cloned an adult animal, a sheep named 'Dolly,' while Craig Venter sequenced the human genome in 2000, with the first publicly available genome being from JD Watson and Craig Venter themselves. These discoveries have vast implications and applications. In 2010, Craig Venter demonstrated the autonomous replication of a synthetic genome, raising the possibility of creating life in a test tube designed by humans using pens, pencils, computers, and bioinformatics as tools. The use of recombinant DNA technology began to modify bacteria, plants and animals so that they become suitable for a variety of uses, such as, crop growing, baking, winemaking, antibiotic and hormone production, xenotransplantation and gene and stem cell therapy.

Development of Biotechnology in India

In 1986, the Department of Biotechnology (DBT) was established by the Ministry of Science and Technology in India, marking a significant milestone in the development of modern biotechnology in the country. The DBT has emerged as a driving force and has established numerous centers across the nation. These centers play a crucial role in fostering the development of skilled professionals in the field of biotechnology

and promoting research and development in the private sector. The Indian government has been actively sponsoring research in various areas such as genetic engineering, molecular biology, agricultural and medical sciences, plant and animal tissue culture, biofertilizers and biopesticides, environmental biotechnology, human genetics, microbial technology, and bioprocess engineering.

A robust framework has been established for the regulation of Genetically Modified Crops and Recombinant DNA products, ensuring the safety and efficacy of these technologies for human health. To support and promote innovation, the Indian government has introduced new policies in the field of biotechnology. The implementation of the patent system in 2005 reflects India's commitment to foster new initiatives and protect intellectual property rights. Overall, the development of modern biotechnology in India has been facilitated by the establishment of dedicated institutions, government support through funding and policies, and a focus on research and development in key areas. These efforts aim to position India as a leader in biotechnology and contribute to advancements in various sectors benefiting society as a whole.

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Kautilya's Arthashastra and Indian Foreign Policy

Introduction -

The Arthashastra is an ancient Indian treatise compiled by Chanakya also known by the names Vishnugupta and Kautilya during the Gupta period. In the following article, we try to analyze Arthashastra's relevance with the current Indian Foreign Policy. The Arthashastra is an important treatise in ancient Indian history. It gives us an understanding of the level of development of governance, foreign policy, tactics of warfare, economics, etc of that period. This article tries to provide an overall impact and relevance of the Arthashastra on current Indian Foreign Policy and its implications. The article also provides examples for a better and easy understanding of the concepts and terms mentioned in it.

The theory of Yogakshema- "welfare state" -

Yogakshema -The welfare of a state ensuring the security of a state within its existing boundaries and acquiring new territories to enlarge it depends on adopting a policy of non-intervention or overt action- establishes the basis of all foreign policy.¹

India has adopted the policy of non-alignment. Commonly Non- alignment is perceived as taking a 'middle path' or neutrality or being equidistant, which is not the aim. Non-alignment is 'freedom of action which is a part of independence'.² It is the capacity in which the independent nations would be free to take their own stand without being perceived as being inclined to either side [in the cold war period]. Hence, India's foreign policy which is often defined as non-alignment is comparable to Kautilya's theory of Yogakshema.

According to Mitra and Liebig, the Kautilyan raison d'état integrates two fundamental value ideas:⁷

1. Maintaining and expanding the power of the state.
2. Ensuring the welfare and security of the people.

Sadgunyas

As is the nature of the Sadgunyas given by Kautilya, so is the foreign policy of any country. The Sadgunyas are said to be dynamic and changing with the varied circumstances, an enemy or a friend is never permanent, and the nature of the relationship constantly evolves. This altering nature of the foreign policy is due to the few unstable factors on which it is determined. In India too we have had several stages of foreign policy with differing natures of relationship with the countries from time to time.

The Parliament attack of 2001, Mumbai Attacks of 2008 proved to be a blow to the diplomatic and the CBMs [Confidence Building Measures] India was trying to pursue. The Uri attack took place in 2016, and India responded with surgical strikes. The 2019 Pulwama attack on the Indian military convoy was retaliated. Indian Air Force warplanes crossed the LOC and destroyed the terrorists' base camps in Balakot province of Pakistan.

There are many reasons for this change of policy. One of them was, through the years India came to be recognized as an emerging nation with tremendous potential, whereas on the other side, Pakistan was on a downfall globally. This time, India had relatively greater internal stability in addition to her increased influence in the world. It was in a much stronger position to counter the attacks.

These strikes on Pakistan can be seen as one of the strategies of the Sadgunyas, YAAN [March]. [Yaan- when one's own power is rising vis-a-vis the rival state]

The US supported India during the 1962 India- Sino War. Although it had an ulterior motive of curbing the communist influence in South Asia, it provided India with the required ammunition and support. India's trusted ally, the USSR, had chosen to not interfere, so India was left alone.³

In the 1970s, India was said to have fallen short to reach the target of '9.5 million tonnes of wheat, and had acquired only 6.45 million tonnes which was an improvement from the previous year's collection of 5.8 million tonnes'. India had to then import wheat from the USA. Although the Indira Gandhi Government claimed that the imports were only to maintain a buffer stock for controlling consumer prices.⁴

The 123 Agreement [Henry J. Hyde United States - India Peaceful Atomic Cooperation Act 2006] with The United States of America signed by India in 2005, aimed at meeting India's energy requirements.⁵ This deal opened up India's opportunity to sign deals with other nuclear powers like France and Russia.

Hence, looking back at the India- US Relations, India was always an impoverished state in comparison to the US when interacting with the US. This state can be compared to one of the Sadgunyas, SANSHRAYA [seeking shelter]

Yuddha -

One of the tactics explored in the Arthashastra is the YUDDHA. The first is PRAKASHAYUDDHA [open warfare], this technique is not used anymore, which involves a place and a time to be decided by both parties for fighting a war against each other. The 2nd technique is the KOOTAYUDDHA [concealed warfare], the technique of using 'deceptive techniques in the battlefield'.⁶ The third is TUSHNIMYUDDHA [silent warfare]. When this technique is employed, the state appears to be stable and running smoothly, but the seeds of deception are being sown, and also the use of secret agents. The third technique was partially used by India during the 1971 Bangladesh Liberation War, with India employing and creating

a network of secret agents, helping the Mukti Bahini for throwing off the West Pakistan Government from East Pakistan [now Bangladesh]. For Kautilya war was inevitable, but it was to be used as the last resort. Arthashastra can be considered one of the earliest books in the discipline of REALISM.

Mandala Theory -

The Arthashastra's relevance can be seen in the Indian Subcontinent and especially on the Indian Foreign Policy. The Mandala theory declares - "Your neighbour is your natural enemy and the neighbour's neighbour is your friend"

To justify the above-mentioned phrase we will take a few examples into consideration and try to understand the relevance according to the current scenario.

PAKISTAN, a nation-state currently going through its worst phase, was created during the fight for independence and was seen as a competitor to its immediate neighbour i.e. India. India and Pakistan have had a troubled and complex relationship and are not on good terms since the beginning and there are ample examples to justify this, be it the wars, terrorist attacks, illegal cross-border firing or interfering in Kashmir politics etc. Pakistan has always tried to show us that they are our competitors. Pakistan is a democracy that is actually controlled by military personnel and big industrialists, is now internationally recognized as a state which shelters terrorists like Bin Laden and has the headquarters of organisations like Lashkar-e-Taiba etc.

The Mandala theory here can be seen playing a relevant role where Pakistan is India's difficult neighbour and Pakistan's immediate neighbour i.e. AFGHANISTAN is a great ally of India, even after the change of power. The Taliban's and the local people of Afghanistan are still in favour of India as India has heavily invested in their development projects. Another reason the Afghans have is border issues. Afghanistan has accused Pakistan of creating mischief at the borders of Afghanistan for training militants and later using them for creating a nuisance both in India and Afghanistan. Looking at the current scenario, even if Afghanistan is an Islamic Republic rather than collaborating with Pakistan which also is an Islamic Republic, it tries to woo India and wants stable relations with her. Today, India does not recognize the current Taliban government as it has acquired power with illegal means and has attacked the fundamental rights of citizens, especially women.

India continues sending aid and carrying on the pending development projects in Afghanistan.

Another example in this sense can be taken is of CHINA. China got its freedom in 1949 and in the early years it was a friendly neighbour to us but as years passed, it went into a completely different phase and began expansion. China annexed Tibet and forced Tibetan people and the Dalai Lama to take refuge in India. China was involved in a war with us in 1962. It opened up war in the state of Arunachal Pradesh but claimed the territory of Ladakh and today that area is known as Aksai Chin.

Today, China claims the entire Arunachal Pradesh as theirs and even has its eyes on small island countries like Taiwan. China became a manufacturing hub for the world and it developed nuclear weapons, built one of the strongest navy, established ports across the globe and is now an important stakeholder in the Indian Ocean. Today, China has only one true competitor in the Asian continent in all aspects be it geography, military, population, economy etc. which is India. India and China have great trade relations but the relations once again escalated in 2013 and the latest incident of Galwan has further made the situation more difficult. This problem of expansion is faced by JAPAN as well and, unlike the earlier years, Japan today is a very different nation-state. It doesn't possess any nuclear weapons and thus it makes it difficult for them to tackle the Chinese pressure. India and Japan are part of a regional group called QUAD which comprises nations like the United States of America, Japan, India and Australia, which have a common goal of a free and fair Indo-Pacific. This is where once again the Mandala theory and its relevance can be seen. The relevance and its importance as well as utilisation is seen in the Indian Foreign Policy and one cannot straightaway say that it is outdated as it is a treatise from the ancient times. Here one needs to take into consideration the fact that, even if times change the culture has an immense impact on the lives of the individual and that impact is eventually seen on the state too. While we agree on the fact that the Arthashastra has many such things which cannot be implemented in today's dynamic and globalised world.

Conclusion -

Through this article, we have tried to sum up some of the theories and tactics given in the Arthashastra by Kautilya. There are many theories that would find further relevance to India's policies foreign and domestic. The examples cited are what we found to be in cohesion with Kautilya's theories. Hence, the opinions may differ. This topic is extensively researched by learned professors of our country and is also included in Indian Knowledge System (IKS). Our aim through this article was to only find congruence to the theories we found relevant. As is the case with the Western framework of foreign diplomacy, we cannot try to fit and correlate each decision by the Indian government with the Kautilyan theories and policies. But it is important to know that India has a strategic culture that is rooted in ancient times. It is only a matter of time till all of us are aware of this strategic culture.

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The Enduring Journey of Arts

Art is the Latin term originally derived from Latin 'Ars' which originally meant skill or craft but when it comes to the influence of art in human life it is beyond its literal meaning. From ancient times to current time 'Art' has influenced human life in so many different ways. From the birth to the death of a human being art is everywhere. There are so many forms of arts for example painting, architecture, sculpture, literature, music, performing and cinema etc., but in current times the general perception of the society seems to be to see art as a form of expression and entertainment but it's beyond its usages. To express human emotions, thoughts and to widen the imagination and perspective, art is required. Art is the most appealing and beautiful thing in our society, it acts as a representative of artists to express their thoughts in front of the world, and human emotions exist in such a way that it requires certain sources to express and evolve it. Human beings express their emotions in the form of literature, poetry, drama, music, dance, crafting, painting, etc. When we listen to some kind of music we try to connect with that music and emotions are generated according to the form of music we listen to. Sometimes humans are really unaware about their emotions and they don't find a way through for their emotions but at that time music helps to pour our heart out.

'Drama' which requires the different skills of well designed voice tone and music of the artists to their cosmetics and costumes! These skills are required which come under art form as well. Through drama people feel heart to heart connection with the artists. If the play is well designed and performed well then the audience feel purgation of emotions (especially such as pity or fear) primarily through art which is also known as catharsis; it helps the audience to connect with strongest feelings and to get relief with certain emotions.

When a baby is born, during their toddler age, the baby tries to identify their surroundings and try to communicate through language and language itself is an art of symbols in composition and music of sound at play. Language is the system of sounds and writing that human beings use to express their thoughts, ideas and feelings and here the journey of art starts and continues throughout life. There are few noble pursuits in our society such as Medical, Law, Business, Engineering but all these fields are incomplete without art. In the Medical field to understand cell structure, physiology, human anatomy. Medical illustrations are required and to make these Medical illustrations perfectly there should be a fine work of sketching, painting, drawing, lining, etc., and all these things come under Art. In Business field, to make good presentations, art work is required and good presentations have a significant purpose in the business field which is to inform, to pursue and to entertain their audience. In Engineering right from understanding the structure of electrons to working of electrical circuits and from mechanics to different machineries to understanding the working drawing, designing and sketching is indeed required to make complex things simple. Art helps in Psychological studies as well because certain things of psychology are understood through visual arts, music, literature,

design, film performances and the environment. Art therapy is used as a form of expression and helps to improve cognitive function, creativity, self awareness, emotional resilience because all these things are required for personal growth of human being. Art carries through many generations and it helps to connect and bind people, but other important aspect of art is to generate employment for people, because art helps to generate more creative job opportunities and boost revenue and it will help local businesses as well.

All things are meant to signify one thing, that is human life is incomplete without 'Art' and Art really had a great influence on human life. "One of the greatest artists in the world is 'Nature'".

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Glimpses of Past

The Making of Sir Parashurambhau College In Colonial India

The city of Pune, known as the cultural capital of Maharashtra owing to the rich amount of historical culture this city has inherited since time being. The traces of history are visible in the architectural remains throughout the city in the form of temples and traditional residential complexes known as 'Wada'. After the advent of British colonial administration in the 19th century, the city saw a rapid growth in the field of education and soon came to be acknowledged as the land of intellectuals and hence often styled as "Oxford of the East". The Deccan College founded in 1821 is one of the oldest educational institutions in Pune followed by College of Engineering (COEP) and Fergusson College. But when it comes to highlighting the cultural heritage of Pune, the Gothic buildings and the history of these age old institutions often get shadowed by the ornate temples and decorative wadas. One such heritage structure, situated right in the heart of city, built in the then newly formed Indo-Sarajenic style is the campus of Sir Parashurambhau College. History of this college is vast and important which needs to be acknowledged as it fills the lacune in the urban history of this town. Here the article aims not only to recall the history of the institution but also to put forward some of the unknown aspects of it known through new sources. Volumes of the college magazine titled "New Poona College Magazine" (1916-1927) later as "The Parashuramian" and some other books are the main source material. Additional references from contemporary newspapers such as Kesari, Andrapatrika and The Bombay Chronicle are also used. Readers should note that some details and citations are intentionally provided as the article is articulated as a compendium for history of Sir Parashurambhau College.

The Beginning

Sir Parashurambhau College was founded by Shikshan Prasarak Mandali, who were admirers of the late Vishnushashtri Chiplunkar. It started as Nutan Marathi Vidyalaya in Budhwar Peth, a primary school back in 1883. Chiplunkar was an eminent scholar of Marathi language, often regarded as the father of nationalism in Maharashtra. Aryabhushan printing press, founded by him, is where earlier volumes of New Poona College Magazine were printed. By 1886, the small school had developed into a full-fledged high school. Some young graduates of this high school had plans for further development, which took form around 1915. After the final approval by Bombay University, a new college was established which came to be known as New Poona College. The retiring superintendent of high school, Vinayak Apte, took charge as the first principal of the college, and it was he who gave the college its motto from the Sanskrit play Mudrarakshasam.¹

The opening ceremony of college took place on 14th June 1916 with a grand and impressive function.² The magnificent 'mandap' erected on the occasion tied with the festoons of mango leaves and the miniature Union Jacks symbolised the philosophic union of the East and the West. The ceremony was attended by notable scholars as well as politicians of the time such as Dr. R.G Bhandarkar, Diwan Bahadur K.R. Godbole, novelist Hari Narayan Apte, Sh. Chintamanrao Patwardhan (Chief of Sangli State), and Sh. Narayanrao Ghorpade (Chief of Ichalkaranji State).³

The college building was formally opened by H.E. Freeman Thomas, the then Governor of Bombay Presidency, with a silver key. In his speech the Governor was assured of the success of this institution as it was formed on strong foundations laid by prominent educationalists of the time. It was here in February 1917 when Cpt. Sir Parashurambhau Patwardhan first visited the college and showed great interest in affairs of the school.⁴ Jagannath Maharaj Pundit, Lokamanya Tilak and Bhau Maharaj Bag.

Two years had elapsed since the college was opened as a second grade college (A system of evaluating institutions.) and it was now preparing to satisfy the conditions required for being affiliated as a first grade college.⁵ One of the conditions was to secure a suitable site outside the city to construct the new college building. The search for the new site ended when Jagannath Maharaj Pandit leased his 25 acres of land to Mandali at a nominal fee. The ancestry of Jagannath Maharaj can be traced back to Shri Tatya Maharaj who was grandson of Shri Siddheshwar Maharaj, a learned and saintly man who was appointed as the spiritual preceptor of Chhatrapati Shivaji Maharaj III of Kolhapur State some time before 1800. Siddheshwar Maharaj and his family were awarded hereditary land grants and honours for their maintenance and dignity.

His youngest son, Bhau Maharaj, served the state of Kolhapur as Prime Minister from 1813 to 1821. The grants were upheld by the British government upon the downfall of Peshwas and returned to Bhau Maharaj along with three additional villages as Jagir in August 1818, currently in Belagavi district. In 1828, Bhau Maharaj petitioned the government to be allowed to exchange one of the villages granted to him for others situated in Poona where he usually lived. The exchange was approved after his death in 1838 whereby villages in Poona district together with other lands were exchanged for ones in Belagavi. These villages were granted to descendants of Bhau Maharaj.⁶ In 1897, the then descendant Baba Maharaj died without an heir. It caused a dispute between his adopted sons Bala Maharaj and Jagannath Maharaj to claim the rightful owner of lands and the title. In July 1906, the Subordinate Judge decided in favour of Jagannath that he was validly adopted as son of Baba, yet the other claimant was still discontented. The court battle continued for another decade. During this time, Jagannath Maharaj who was still a minor, was firmly supported by Lokamanya Tilak.

The verdict finally came in 1918, Jagannath Maharaj had won the long drawn battle. Jagannath was of the opinion that if it wasn't for Lokmanya Tilak his victory was nearly impossible. The court case had cost Lokmanya Tilak a deal of time and money, yet he fulfilled his promise made to Baba Maharaj of appointing the rightful heir to the Pandit family. Jagannath who was now 23 years old felt vehement gratitude towards Lokmanya Tilak and sought to repay him for his help. He approached Tilak multiple times for his cause but Tilak refused to accept any kind of remuneration as he thought of Jagannath as his own son. Jagannath who was still adherent for his cause again approached Tilak who advised him to donate some of his land in Sadashiv Peth to Shikshan Prasarak Mandali; a donation which Tilak would accept as his payment. Jagannath Maharaj readily agreed and the contract for transfer of land was signed between Jagannath Maharaj Pandit and Prin. V.G. Apte then secretary of Mandali on 21 May 1918. 25 acres of land previously known as Shri. Bhau Maharaj Baug was leased for a period of 99 years at a mere charge of Rs. 1500 per annum.⁷ The contract had no other terms and conditions, it was a donation given for a noble and just cause. He donated this land at a time when he was facing a massive loan debt of his own which was around 3 lakhs. It took him another eighteen years to repay the loan which he could have repaid in a year if he had sold the land. It was the selflessness of Lokmanya Tilak and the gratitude of Pandit towards him which amalgamated in fulfilling this noble cause. New Poona College And The Pandemic In Poona.

A couple of years from late 2019 was the period of COVID-19 pandemic worldwide. The pandemic took a toll on the education system as well when schools and colleges were closed for a considerable amount of time. S.P. College was still at the forefront in helping people face the pandemic. Around a century back we find records of a similar situation. The period of 1918-19 was a period of ghastly Influenza pandemic which affected around twelve million lives.⁸ It was locally known as the Bombay Fever. The regions of Bombay, Poona, Ahmedabad and Sholapur were most affected. The issues of New Poona College Magazine do not miss to record the horrors of pandemic at multiple instances and have described it as a state of utter helplessness⁹ The pandemic affected college too as it was forced to close down prematurely. The New Poona College never lacked in its efforts to help people even then, when college authorities were approached by then president of Poona Municipality to allow use of the college building as a temporary hospital. The college building was accordingly placed at their disposal for an allopathic hospital which was further extended to accommodate an additional Ayurvedic section.

Everything was done to facilitate the work of doctors and physicians. Pandemic started to decline during mid-November 1918. Lord Willingdon himself came to close the hospital and resume the college functioning as usual. H.N. Apte remarked on the occasion that it is one of the rare instances when closing ceremony was more pleasant than the opening ceremony. College staff regarded it as a great privilege to be of service to the public during trying times. Lord Willingdon thanked everyone who

made the working of hospital a success.¹⁰ Whether history repeats itself has always been a matter of debate among historians but important to note is what do we learn from our experiences of the past. Itsurely answers the question of why study history when today it is only used as a mere prop in the hands of politicians- “well it has lessons!’

The New Building And The New Name.

Now that the land has been acquired, construction of a grand new college building was initiated. The construction was stopped for a while when it reached plinth level as government sanction of further work did not arrive.¹¹ The cornerstone was laid by Sir Leslie Wilson, The Governor of Bombay Presidency, on 14 October 1924 with a felicitous ceremony.¹² Mandali still lacked substantial amount of funds but donations from diaspora throughout the presidency always came in for the noble cause. Slow and steadily one wing of building was completed by 1926. College authorities considered shifting classes to the new building from June 1926 while the entire building was supposed to be completed within a year¹³. The construction was also delayed for a considerable amount as initial plans of the main building were rejected by the government. One of the official plans which was approved by the government had a supposed clock tower to be constructed in central part of the main building.¹⁴ The plan was later scrapped due to lack of funds. Had it been approved Pune would have had its eighth clock tower.¹⁵ Instead an artistic Saraswati comfortably enclosed in a niche was placed on top, she can be still seen smiling benevolently on the scene beneath.

A student Triambak Balwant Abhyankar has blessedly versed the above move in a Sanskrit poem he composed about the college*.¹⁶

The opening ceremony of the magnificent new building of New Poona College was one of the grandest events experienced by Poona that year. The building was formally opened by H.E Leslie Wilson, Governor of Bombay, on 20 June 1927.¹⁷ It sure was the proudest day for Shikshan Prasarak Mandali as one of their institution was now fully developed. The building that time was one of the largest in Poona city built with a total cost of Rs. 4,40,000¹⁸ Meanwhile Cpt. Sir Parshurambhau Patwardhan (Chief of Jamkhandi State), who was a regular benefactor to Mandali, died accidentally in 1924. Parshurambhau Patwardhan, a patron of education, had planned to establish a second grade arts college at Jamkhandi. Efforts to implement this plan was now taken up by his son Shankarrao Patwardhan alias Appasaheb Patwardhan, who succeeded him as ruler of Jamkhandi. While the Plan was in development Sir Parashurambhau Memorial Fund was established at Jamkhandi and a substantial amount was collected and kept aside to build the planned college.¹⁹

The proposal was however returned by Bombay University citing that it had no provision to sanction a second grade college. Appasaheb was determined to use the collected funds only for the desired purpose. During the said period, he was elected

as President of Shikshan Prasarak Mandali Therefore the management of the New Poona College requested Appasaheb to donate the Captain Parashurambhau Patwardhan Memorial Fund to the college as it was facing financial hardships. Appasaheb gave his consent to donate the funds and immediately donated one lakh rupees to Mandali and an additional one lakh to be sent in instalments of Rs.5000 per year. He put forth a condition to change the name of "New Poona College " to "Sir Parashurambhau College " In memory of his father. He also added a condition of free admission and education to 50 students from Jamkhandi state.²⁰The existing name that is New Poona College did not commemorate any particular person or community, so the management readily agreed to change the name from "New Poona College" to "Sir Parashurambhau College.The townspeople hesitant to accept the change were convinced through a dedicated article titled "Once a New Poonait! Always a New Pooniate!"²¹

The Lost Legacy Of Plaques

Marathi writer and humorist P.L. Deshpande in his speech at the opening ceremony of Balgandharva Theatre in 1968, had pointed out the great irony of Pune city where the memorial of 'Balgandharva' is placed near statue of Rani Lakshmbai who distinguished herself by playing a man's role being a woman.²² The current statue on J.M. Road is not the only connection Pune has with Rani Lakshmbai; one can be found in the very first room of the college's main building. The plaque here records the hall named after Anant Sadashiv Tambe. Sadashiv Tambe was younger brother of Moropant Tambe, the father of Manikarnika Tambe alias Rani Lakshmbai.²³ A.S Tambe himself was a notable officer during the colonial period who served as Junior Administrator of Porbandar State during 1909-10²⁴ and later as Deputy Assistant and Political Agent of Kathiawar State.²⁵ He was awarded the title of Rao Bahadur for his services. When he died in January 1929, his daughter Krishnabai Tambe donated Rs.8000 on his first anniversary in 1930.²⁶ Honouring his memory college celebrated A.S. Tambe day on 9 January 1932. Various competitions for students were organised along with a ceremony which was presided by S.R. Bhagwat the Chief Officer of Poona Municipality. A.S.Tambe prize for the best essay was won by V.D.Waikar for his essay Aapli Danpaddhati (Our Donation Systems) surely a title suitable for the given award.²⁷ Another prominent personality which slips through our eye sight is Shapoorji Broacha, popularly known as King Of Bombay Share Market during the initial decades of 20th century. Life of Shapoorji Broacha is an incredible rags-to-riches story, a man of great generosity. His donation of 20,000 was crucial for growth and maintenance of the college's library²⁸ A plaque of his name today sits above the library reading room. There are many such plaques throughout the campus whose stories are yet to be explored.

लेख्यने रम्यणे सुचिचित्रि तं च सरस्वती मन्दिरम बहच्च ॥
जनान्तराकर्षि च कालयन्त्रो पर्यास्ति सौधोन्नतमध्यभागे ॥

Other facilities such as Student hostels, Principal's Bungalow, staff bungalows and a pavilion were added subsequently as required.²⁹ A special room for female students was made possible by donation of Captain N.S.Jathar Superintendent of Nagpur Central Jail. He donated Rs.1500 for commissioning the present Ladies Room in the name of his deceased wife Bhagirathibai Jathar. He also provided scholarships for female students who excelled academically.³⁰ Need for an enclosed assembly hall for student activities too was provided. Lady Ramabai Patwardhan, the Dowager Ranisaheb of Jamkhandi had given donation of Rs. 12,500 to Mandali. In recognition of this donation the college assembly hall was renamed as Lady Ramabai Assembly Hall. The naming ceremony was performed at the hands of Dr. M.R.Jaykar on 29 March 1936.³¹ The year of 1941 marked the Silver Jubilee of foundation of Sir Parashurambhau College. The Silver Jubilee function took place on 20 -21 December 1941. Maharaja of Baroda State Pratapsinh Gaikwad presided over the occasion and performed the opening ceremony of a chemistry laboratory named after him. There were then gathered in the tent the gentry, the nobility, the aristocracy, the intellect, the trade, the authority, scholars, alumni and students too many to be named. On second day the bust of Lokmanya Tilak placed in front of the college was inaugurated by politician M.S.Aney.³²

Donations And Visits By Eminent Personalities

Throughout the period, the college received many donations which were absolutely necessary during trying times of pestilence and wars. It always had a rather close relation with princely states and nobility when it came to receiving donations. Notable among those are Mudhojirao Nimbalkar of Phaltan State³³, Balasaheb Pantapatnidhi of Aundh State, Shankarrao Chimnaji of Bhor State³⁴, Fatehuddin Khanji The chief of Manavadhar State³⁵, Ghanshyamji Ajitsinhaji, the Maharaja and Mansinhaji Jhala, the Diwan of Dhrangadhra State,³⁶ Lallubhai Shamaldas, the Diwan of Bhavnagar State.³⁷

Donations came not only from nobility but from a wide range of social strata: Gandharva Natak Mandali donated 608 rupees in 1917³⁸. There are records of donations from Berar Trading Company and Nagappa Bandappa Kadadi who later founded Sangameshwar Educational Society in Solapur³⁹. Another gentleman from Solapur K.N, Dixit assigned his life insurance policy of one thousand in favour of Mandali which was received in 1928⁴⁰ B.S.Sukhthankar a solicitor from Bombay, executor of the will of the late Mrs.Savitribai Bhat handed over to Mandali an amount of Rs.5000.⁴¹ In January 1933 on the occasion of Silver Jubilee of Nutan Marathi Vidyalaya the students donated the amount collected by their two performances of Sangit-Ekach Pyala to Mandali.⁴² Mrs.H.E.Green from USA sent donations of 200 dollars in 1960's. The most touching gift of Rs.1100 was received from Kamgar

Sangh, the workers of college building which proved that generosity is not the prerogative of the rich alone.⁴³ Apart from funds, donations also came in the form of books for the library. Historians- History of World was donated by one W.G.Sane from Jabalpur, M.S Phadke presented the 9th Edition of Encyclopedia Britannica in memory of his grandfather Rao Bahadur B.R. Sahasrabudhe. The Assistant Collector of Dharwad donated a collection of hundred and fifty volumes comprising various subjects. It was these donations which facilitated the nurturing of students who achieved great success in their fields, among whom are Pandurang Sadashiv Sane, R.V.Oturkar, Shanta Shelke and Aruna Dhere.

College was visited by multifarious dignitaries on various occasions. Sir Jamsetjee Jejeebhoy, The 5th Baronet presided over a memorable lecture organised by the college debate union. Vitthalbhai Patel activist and elder brother of Sardar Vallabhbhai Patel visited college in 1917.⁴⁴ Sir Ibrahim Rahmatullah, politician and Mayor of Bombay City, opened the new halls of college when it was affiliated as a first grade college in 1918.⁴⁵ Prof.Jadunath Sarkar gave a lecture to students when he visited college in 1920.⁴⁶ In July 1921, Mahatma Gandhi accompanied with Sarojini Naidu visited the college where he promulgated the idea of Swadeshi among students.⁴⁷ Rabindranath Tagore in his visit to Poona city visited college with R.D Tata in 1922.⁴⁸ Muhammad Ali Jinnah with his wife attended the anniversary day celebrations of 1924 where later in evening he delivered an address in the fully packed audience hall.⁴⁹ Annie Besant too delivered a lecture just few days before on the occasion of the college's social gathering.⁵⁰

The first social gathering in the new building was presided by Shankaracharya Maharaj Kurtakoti of Karveer Peeth.⁵¹ Sir. C.V. Raman was invited to visit the college by Prin. R.P.Sabnis, which he gladly accepted and delivered a lecture to students in August 1931. Sir M.Visvesvaraya paid a visit to college later in the same year.⁵² The second session of Bombay Presidency Youth Conference took place in the premises of the college. session was presided by none other than Pt.Jawaharlal Nehru.⁵³ Dr.Babasaheb Ambedkar paid a visit to the college in March 1945.⁵⁴ The College was visited by foreign students and professors several times during 1960's.

S.P. College completed 105 years of its foundation in 2021. The plant assiduously nurtured by Shikshan Prasarak Mandali now has branched into multiple institutions namely Prof. Naralkar Institute of Management, Haribhai Deokaran School in Solapur, Ramnarain Ruia College and Ramniranjan Anandilal Podar College in Mumbai. Addressing the ceremony on the occasion of Golden jubilee of the college, renowned economist Dr. Dhananjayrao Gadgil said "S.P. now should expand vertically rather than horizontally". Perhaps the vastness of campus is not the mark of academic excellence but it's the educational standard provided by college. A.C. Apte in his article has commented that S.P. should never consider itself as an old institution it should always remain a child who is enthusiastic and graceful trying to achieve new goals.⁵⁵ S.P. College has made an important contribution in the educational, social

and political development of Pune city as well as Maharashtra. The Sir Parashurambhau College which stands today as a scintillating star in the Oxford of the East is due to indefatigable efforts by Shikshan Prasarak Mandali.

The institution has strived for excellence since its inception and its contribution to society is immense. The initial decades of its formation were marked by the Indian Struggle for Independence. The institution has played a significant role in the freedom struggle with the cause upheld by its students, teachers and governing body. For an institution that is 105 years old these are only a few bits about its history which this article explores. However it is certain that if researched through multiple historical sources many new aspects of the Institution are bound to come forward.

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Shivam Anil Kokane (TYBA History)



New Poona College Building
New Poona College Magazine Vol-I No.1
(November 1916)



Young Jagannath Maharaj Pandit with Lokmanya Tilak.
Parashuramiya Golden Jubilee Volume (1966)



Library Hall

(October 1935)



New Poona College

Assessment of Health Indicators in the Districts of Maharashtra Using Geospatial Techniques – A Focus on Child Health, Maternal Health and Family Planning

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ABSTRACT

Maharashtra is a diverse state with varying socioeconomic conditions and regional disparities in healthcare access and outcomes. Conducting an assessment of health status using geospatial techniques will help identify areas within the state that are facing significant health disparities. Understanding these disparities with respect to various health indicators namely - Child Health, Maternal Health, Family Planning and others; is crucial for policymakers and healthcare authorities to allocate resources effectively and target interventions where they are most needed. The present study demonstrates a comparison of the health status and health indicators in Maharashtra, with a specific focus on some health indicators, during pre-COVID and post-COVID period. The study is based on secondary data like health facility, population data, vital statistics, demographic, health surveys, administrative records, family planning-maternal health and child health data collected from NFHS, HMIS and other Government sources. Various Geospatial techniques such as Geographic Information Systems(GIS), spatial mapping, hotspot analysis and spatial interpolation method are used in present study for analyzing the spatial distribution of health indicators. The findings of the study reveals, significant variations in health status and its indicators across Maharashtra State. In the pre-COVID period, certain regions exhibited higher family planning utilization rate, better maternal health outcomes and improved child health indicators, while other regions faced challenges in accessing healthcare services and achieving desirable health outcomes. However, the COVID-19 pandemic had a profound impact on the health indicators in Maharashtra State. The post-pandemic period witnessed disruptions in family planning services, changes in maternal health outcomes and shifts in child health indicators. These changes were observed geographically, with certain regions experiencing more significant impacts than others. The findings will provide valuable insights into the determinants of child health, family planning, and maternal health in Maharashtra and aid in the development of evidence-based policies and interventions to address health inequalities.

Keywords: *Child Health, COVID, Family Planning, GIS, HMIS, MaternalHealth, NFHS*

INTRODUCTION

Assessing health indicators is vital for understanding the overall well-being of communities and informing targeted healthcare interventions. In the state of Maharashtra, India, this study aims to assess health indicators in the districts using geospatial techniques, with a specific focus on child health, maternal health, and family planning. The study will analyze both the pre and post-COVID periods to understand the potential impact of the pandemic on these critical health domains.

The COVID-19 pandemic has had profound effects on healthcare systems and has likely influenced health indicators related to child health, maternal health, and family planning. Examining these indicators in the context of the pre and post-COVID periods will provide valuable insights into the short-term and long-term consequences of the pandemic on these areas of healthcare.

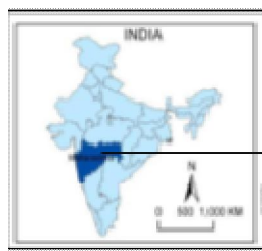
Geospatial techniques offer a powerful approach to analyzing health data by incorporating spatial information. By integrating geospatial analysis with health indicators, this study aims to identify spatial patterns, disparities, and potential areas of intervention in the districts of Maharashtra. Understanding the geographical distribution of health indicators related to child health, maternal health, and family planning will aid in targeting resources and implementing effective interventions to improve health outcomes in specific regions.

By conducting a comprehensive assessment of health indicators in the districts of Maharashtra, this study intends to contribute to evidence-based decision-making and policy formulation. The findings will assist healthcare professionals, policymakers, and stakeholders in identifying areas of improvement and implementing targeted strategies to enhance the health and well-being of communities, particularly in the domains of child health, maternal health, and family planning.

NEED FOR THE STUDY

The assessment of health indicators in the districts of Maharashtra, focusing on child health, maternal health and family planning, is crucial for several reasons. Firstly, it provides insights into the overall health status of these vulnerable populations, guiding targeted interventions and resource allocation. Secondly, analyzing health indicators in the pre and post-COVID periods allows for understanding the potential impact of the pandemic on these domains, aiding in policy formulation and healthcare planning. Lastly, utilizing geospatial techniques offers spatial analysis, identifying regional disparities and areas of intervention, thus facilitating effective strategies to improve the health outcomes of children, mothers, and families in Maharashtra.

STUDY AREA



**Latitudinal Extent:
Between 16° N and 22° N**



OBJECTIVES

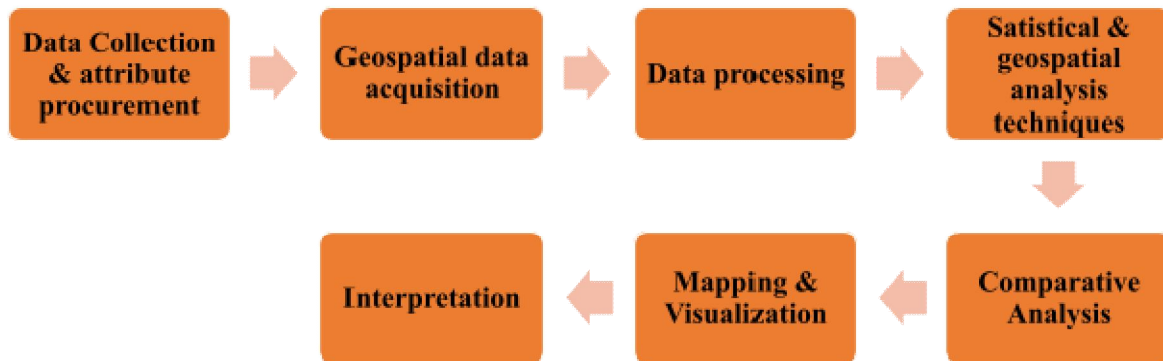
Current topic is very much wide in nature and has too many health indicators to study. Here we are focusing on few indicators which are important. So, following are the measure objectives of the present study -

- 1) To assess the health status of districts of Maharashtra using geospatial techniques.
- 2) To understand the various health indicators such as family planning, maternal health and child health during the pre-COVID and post-COVID period.
- 3) To suggest measures for improving health system in study area.

DATA REQUIREMENT AND SOURCES

Segment	Sources
Health Facility Data ✓ Child Health ✓ Maternal Health ✓ Family Planning	NFHS (National Family Health Survey) – NFHS 1, NFHS 2, NFHS 3 ,NFHS 4 , NFHS 5
	HMIS (Health Management Information System)
Demographic and Population Data	Census of India , Demographic surveys
Vital Statistics data	Office of Registrar General of India , Maharashtra State Health Department

METHODOLOGY



RESULTS AND DISCUSSION

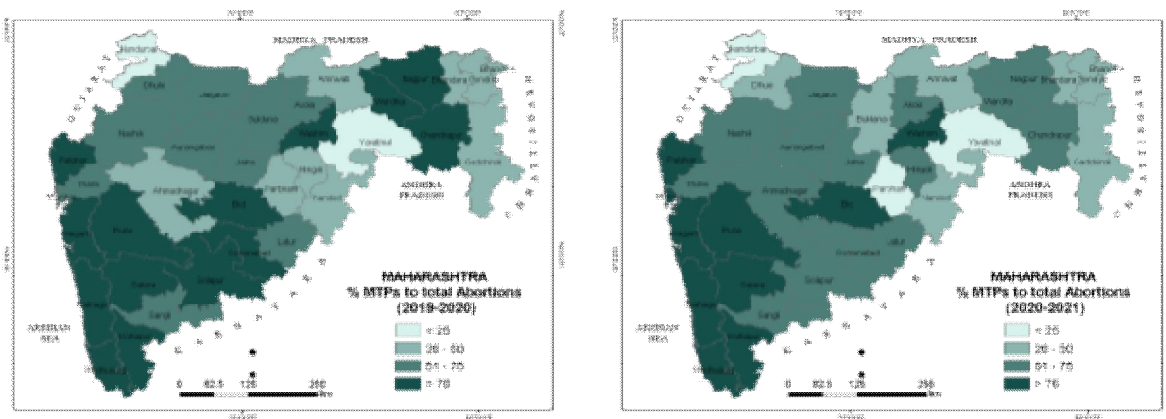
- Results are categorized on the basis of 3 Health Indicators –

- 1) Family Planning
- 2) Maternal Health
- 3) Child Health

- Various maps are prepared and interpreted for the year 2019-20(Pre-COVID) & 2020-21 (Post-COVID).

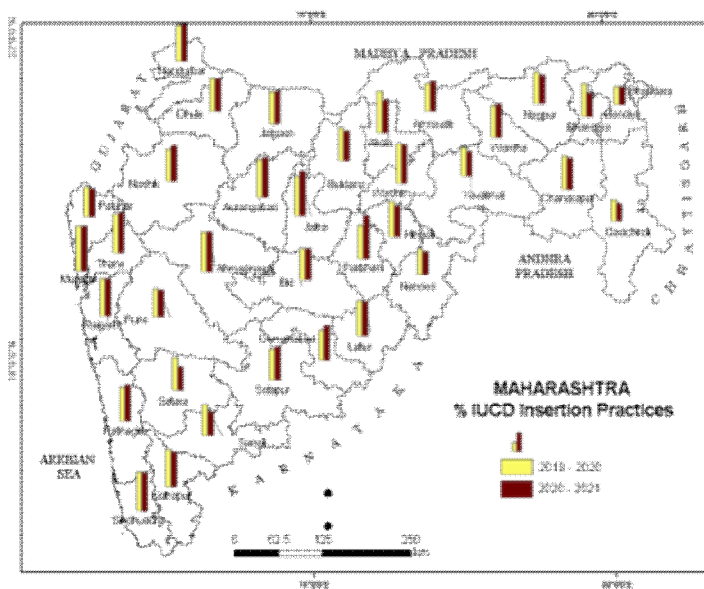
1) Family Planning

a) *MTP to Total Abortions*



- MTP (**Medical Termination of Pregnancy**) is a procedure of **terminating pregnancy** using medicines within **12 to 20 weeks** of pregnancy. MTP can be done for various reasons which includes – **unintended pregnancy, fetal abnormalities, family completion, personal choice, economic burden**, etc.
- We can see that districts like Osmanabad, Solapur, Wardha, Nagpur, Chandrapur, Buldhana, Parbhani have degraded in their percentage from year 2019-20 to 2020-21.
- And most of these districts are From **Vidarbha region and having mostly SC & ST population**, and thus this shows that population from this area was in favour of having child in year 2020-21

- b) **Sterilisation**
- c) **IUCD Practices**



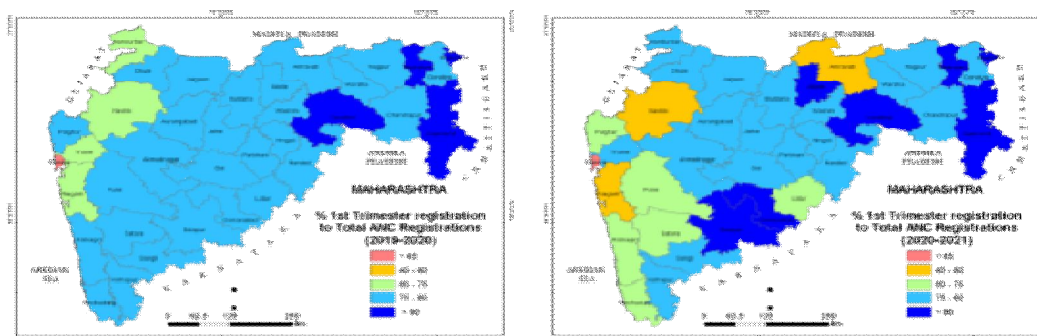
- IUCD (Intrauterine Contraceptive Device) is a small T- shaped type of birth control. It is locally known as **Copper-T**.
- The map gives a clear picture that IUCD practices are common and on large scale in the population. It is one of **easy to use birth control method**. There is **no major change** seen in condition of IUCD usage from year 2019-20 to 2020-21.
- The decreasing trend is captured in districts like Akola, Hingoli, Bhandara, Satara, Sangali, Nanded & others ; whereas districts such as Parbhani Aurangabad, Jalana, Solapur , Ratnagiri have shown increase in usage of IUD practices.

❑ **Reasons for Lack of Family Planning methods in Maharashtra**

- ❖ Limited awareness and knowledge about family planning methods
- ❖ Cultural and social norms that discourage or restrict family planning
- ❖ Lack of access to family planning services and contraceptives
- ❖ Gender inequality and limited decision-making power for women
- ❖ Stigma and misconceptions surrounding family planning methods
- ❖ Inadequate education and information dissemination about family planning
- ❖ Religious and conservative beliefs that discourage family planning

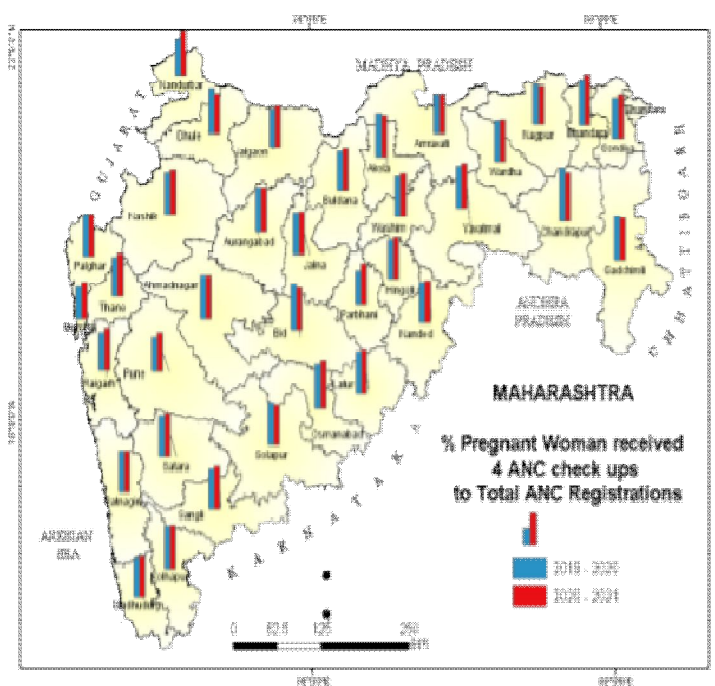
2) **Maternal Health**

a) **1st Trimester Registration**



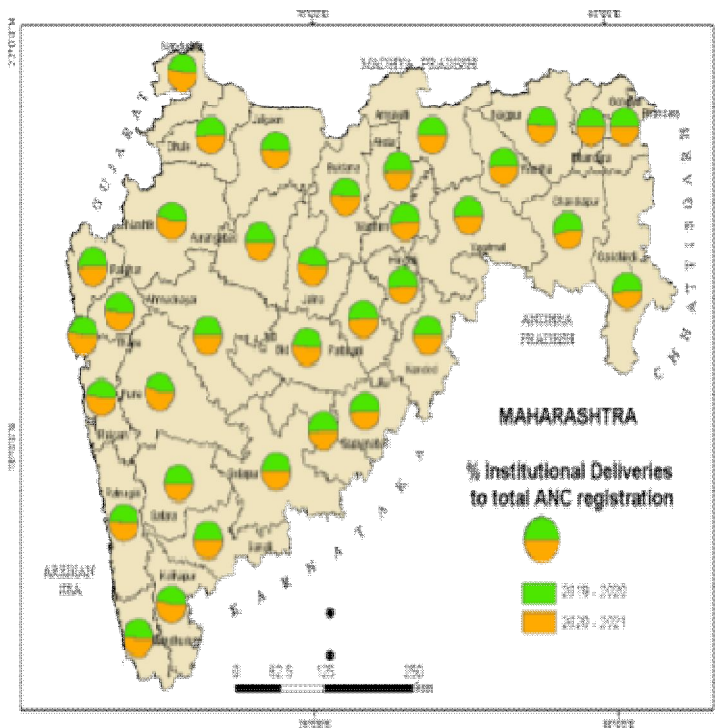
- **1st Trimester** is termed as **first 12 weeks** of gestation or pregnancy.
- It has been noticed from map , that districts like Nashik, Amravati, Raigarh, Nandurbar, Latur, Pune, Satara, Ratnagiri, Sindhudurgh have experienced **less registrations** in 1st Trimester in Year 2020-21 as compared to year 2019-20. So, **awareness** for Trimester registration is required in these states by **PHC's, CHC's & health centers**.
- But in districts like Palghar , Solapur ,Osmanabad ,Akola the percentage of 1st trimester registration is increased.

b) Pregnant women received at least 4 ANC check ups



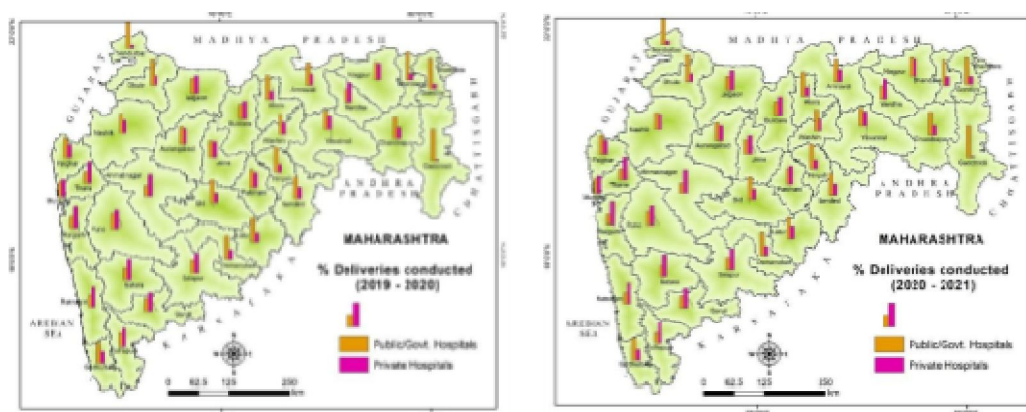
- Antenatal care (ANC) coverage is an indicator of access and use of health care during pregnancy.
- So, almost all districts for both the years show constant percentage in women who have at least gone for 4 ANC check ups.
- Only districts like Mumbai, Bhandara, Gondiya, Yavatmal, Buldhana have shown increased percentage of women going for ANC check up and that is a **good sign of Maternal Health** awareness amongst pregnant women.

c) Institutional Deliveries



- Deliveries can be **institutional** deliveries or **home** deliveries. Institutional deliveries can further be classified as **Public/Government & Private** institutions.
- The map clearly shows that all districts show maintained percentage and trend in institutional deliveries in pre and post pandemic period.
- Nashik, Jalana, Kolhapur and Nandurbar districts are seen with increased percentage in institutional deliveries in year 2020-21 compared to 2019-20.

d) **Public – Private Hospital Deliveries**



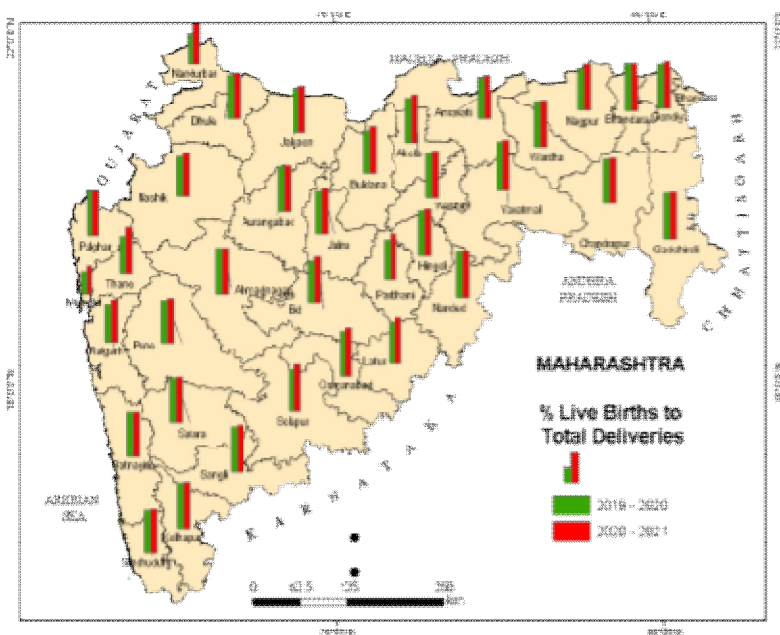
- Deliveries are carried out **Public** as well as **Private** Hospitals/Institutions.
- Mainly districts with **low Per Capita Income** such as Nandurbar, Gadchiroli, Bhandara, Gondiya, Amravati clearly depicts that most people use Public Hospitals for maternity care. These districts are subsequently followed by Akola, Beed, Latur, Osmanabad, Sangli, Solapur & others. Not only economic status of population is reason for this but also the **no. of private hospitals is less** in these districts.
- Opposite to above scenario, population in districts including Thane, Mumbai , Pune , Ratnagiri, Ahmednagar, Solapur, Jalgaon prefer to go to **Private hospitals for maternity care** due to **availability of good infrastructure, specialized services, privacy & comfort , reduced waiting time , insurance coverage , enhanced facilities , flexibility & choices in Private institutions** over Govt. institutions.

❑ **Causes for poor Maternal Health across the State**

- ❖ Limited access to quality maternal healthcare services
- ❖ Inadequate antenatal and postnatal care utilization
- ❖ Lack of skilled birth attendants during childbirth
- ❖ Socioeconomic factors such as poverty and low education levels
- ❖ High teenage pregnancy rates
- ❖ Insufficient awareness about maternal health and pregnancy-related complications
- ❖ Limited availability of emergency obstetric care
- ❖ Cultural and traditional beliefs impacting maternal healthcare seeking behavior
- ❖ Inadequate resources for maternal health programs and services

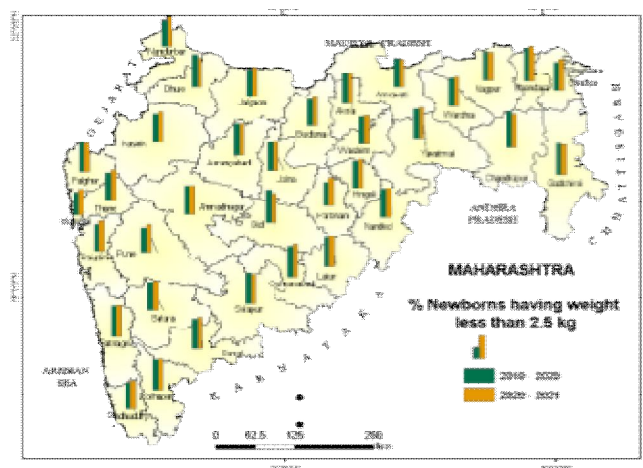
3) Child Health

a) Live Births to Total Deliveries



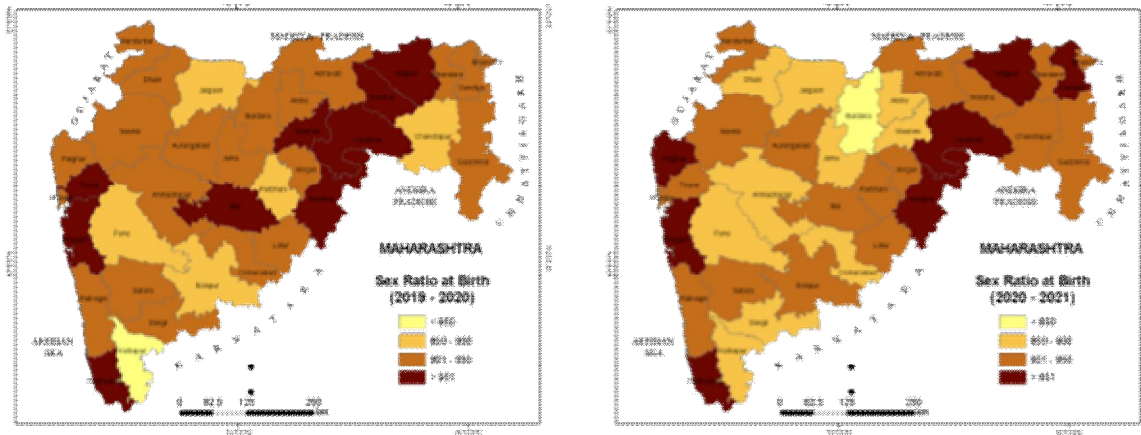
- Live birth is termed as complete extraction of child from mother's body irrespective of duration of pregnancy.
- So, from map it is evident that no district has shown fall in percentage in live births of total deliveries carried out
- And main reason for this can surely be stated that all districts in Maharashtra have improved upon their health care services after the unexpected hit of COVID-19 pandemic.
- And thus all districts are clearly seen in positive results in carrying successful deliveries.

b) Newborns having weight less than 2.5 kg



- Weight of new-born baby is very important to be in ideal category as it is indicator of good health and infant development, organ maturity & immunity. Whereas weight less than 2.5 kg causes health risks, growth & development challenges and long term complications in some cases.
- This map shows light on this scenario . It can be observed that districts like Bhandara, Gondiya, Nashik, Nandurbar, Mumbai, Hingoli , Nanded have shown increase in no. of newborns having weight <2.5 kg in post pandemic period.
- Whereas districts including Dhule, Chandrapur, Beed & others have shown improvement in condition as the percentage of newborns with <2.5 kg weight is decreased in year 2020-21 compared to 2019-20.

- c) **Fully Immunized Children**
- d) **Sex Ratio at Birth**



- Maharashtra has a sex ratio of 929 for every 1000 males, which is less than the nationwide average of 940 according to the 2011 census.
- Apparently , from map it is seen that districts like Palghar, Ahmadnagar, Gondiya, Washim, Solapur have shown increase in sex ratio at birth in year 2020-21 as compared to 2019-20.
- Also some districts including Thane, Parbhani, Jalna, Buldhana, Wardha , Chndrapur, Kolhapur have shown decrease in sex ratio at birth in post-pandemic period. People in districts should be made aware and advocate about this scenario. Legal measures should be implemented to prohibit sex determination tests and sex-selective abortions.

☐ **Grounds which are responsible for Poor Child Health in the Study Area**

- ❖ Malnutrition and poor nutrition practices
- ❖ Limited access to quality healthcare services for children
- ❖ Insufficient immunization coverage
- ❖ Inadequate sanitation and hygiene practices
- ❖ Lack of awareness about childcare practices and nutrition
- ❖ Poverty and socioeconomic disparities affecting children's health
- ❖ High prevalence of infectious diseases among children
- ❖ Limited resources for child healthcare programs
- ❖ Inadequate monitoring and follow-up of child health indicators.

RECOMMENDATIONS

1) FAMILY PLANNING

- **Improve accessibility:** Ensure easy access to family planning services by increasing the number of healthcare facilities offering these services, especially in rural and underserved areas.
- **Comprehensive sex education:** Implement comprehensive sex education programs in schools and communities to provide accurate information about reproductive health, contraception methods, and family planning options.
- **Strengthen outreach programs:** Conduct targeted outreach programs to reach marginalized communities and provide them with information, counseling, and services related to family planning.
- **Engage religious and community leaders:** Collaborate with religious and community leaders to promote family planning, dispel myths and misconceptions, and encourage their support and endorsement of contraceptive methods.
- **Improve postpartum care:** Enhance postpartum care services to ensure that women receive counseling on family planning options immediately after childbirth. This can include providing information about contraception methods, encouraging birth spacing, and facilitating access to contraceptive services.

2) MATERNAL HEALTH

- **Strengthen antenatal care:** Enhance access to and quality of antenatal care services by increasing the number of healthcare facilities offering comprehensive antenatal check-ups, screenings, and health education for pregnant women.
- **Promote skilled birth attendance:** Ensure that skilled healthcare professionals, such as midwives and nurses, are available during childbirth to provide safe and respectful care to pregnant women, reducing the risk of complications and promoting positive birth outcomes.
- **Improve emergency obstetric care:** Enhance the availability and quality of emergency obstetric care services, including access to well-equipped facilities, trained healthcare providers, and emergency transportation for timely management of complications during childbirth.
- **Encourage birth preparedness and complication readiness:** Promote birth preparedness among pregnant women and their families by providing information and education on the importance of planning for childbirth, including identifying a skilled birth attendant and creating a birth plan. Emphasize the need for timely recognition of complications and prompt action.
- **Enhance postnatal care:** Strengthen postnatal care services to ensure that women receive adequate support and healthcare following childbirth. This

includes providing postpartum check-ups, counseling on breastfeeding, newborn care, and family planning, as well as addressing postpartum mental health needs.

3) CHILD HEALTH

- **Strengthen immunization programs:** Ensure high coverage of routine immunizations to protect children from preventable diseases and reduce child mortality rates.
- **Improve nutrition:** Implement nutrition programs that address malnutrition and promote exclusive breastfeeding, proper complementary feeding, and access to micronutrient supplementation for children.
- **Enhance access to healthcare:** Increase the number of healthcare facilities and trained healthcare providers to improve access to quality healthcare services for children, including preventive care, early diagnosis, and treatment of common childhood illnesses.
- **Promote hygiene and sanitation:** Implement hygiene and sanitation initiatives to prevent the spread of diseases and reduce the burden of waterborne illnesses among children.
- **Strengthen early childhood development:** Invest in early childhood development programs that focus on cognitive, social, and emotional development, as well as access to quality early education and stimulation activities for children.

CONCLUSION

The assessment of health indicators in the districts of Maharashtra valuable insights into the status of child health, maternal health and family planning. By leveraging geospatial data, policymakers and healthcare providers can identify areas of concern, target interventions and allocate resources effectively. This approach enables a more focused and evidence-based approach towards improving healthcare outcomes in the state. By addressing these key areas, Maharashtra can work towards achieving better health outcomes for its population, ensuring a healthier future for all.

In conclusion, this research provides valuable insights for –

- targeted interventions,
- resource allocation,
- identification of hotspots and trends,
- planning and policy formulation,
- monitoring and evaluation.,etc.

By leveraging these recommendations, Maharashtra can make data-driven decisions, enhance healthcare services, and ultimately improve child health, maternal health, and family planning outcomes throughout the state.

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The Remarkable Journey of Statistics: From Ancient Numbers to Modern Insights

Introduction

Prepare to embark on an extraordinary journey through the archives of time, where the threads of numbers, data, and probabilities are woven into a grand tapestry. The history of statistics, an awe-inspiring symphony of intellectual triumphs and paradigm shifts, unfolds before us. Join us as we step into a world where ancient civilizations dabbled in statistical wisdom, where brilliant minds carved paths of enlightenment, and where modern science emerged as a magnificent edifice. The growth of statistics in India has been influenced by both historical factors and the contributions of notable individuals. From its ancient origins to the British period and beyond, statistics has played a vital role in understanding the Indian subcontinent's social, economic, and demographic landscape. The developments in the mid-20th century, particularly from 1930 to 1960, marked a significant period of progress in statistics in India, with influential figures like P.C. Mahalanobis and institutions making significant contributions. Understanding the historical context and unique factors that shaped the growth of statistics in India provides valuable insights into its evolution as a discipline.

Ancient Marvels: The Seeds of Statistical Thought

Our expedition commences in the mist of ancient times, where the first whispers of statistical thinking permeated the air. Picture the Egyptian scribes meticulously applying statistical methods to collect data for tax collection and conduct censuses, while the great minds of ancient Greece astutely employed statistical techniques to estimate the size of armies and manage populations. In these distant echoes, we witness the embryonic essence of statistics, silently shaping the course of history. The roots of statistical knowledge and probabilistic ideas in India can be traced back to ancient times as well. References to statistical concepts and probability theory can be found in ancient Indian epics such as the Mahabharata and in philosophical writings like the Jaina philosophy. The Arthashastra, a renowned treatise on economics from the Mauryan period, also highlighted the importance of data collection for various censuses and surveys conducted in villages and towns.

The Renaissance of Numbers: The Birth of Probability Theory

As we traverse the corridors of time, we arrive at the cusp of the scientific revolution in the 17th century. Here, destiny beckons us to witness a pivotal moment—the birth of probability theory. Immerse yourself in the captivating exchanges between visionaries such as Blaise Pascal and Pierre de Fermat, as they delve into the enigma of the "problem of points." Their intellectual courtship ignites the flames of curiosity and gives birth to a new science—the study of probabilities. Their journey sets the stage for the emergence of Jacob Bernoulli and his magnum opus, "Ars Conjectandi," illuminating the mathematical wonders of probability theory in 1713.

The Flourishing Renaissance: Blossoming Statistical Theory

In the gentle embrace of the 18th century, statistical theory emerges as a radiant flower, blooming with enchanting possibilities. As we wander through this era, we encounter the enigmatic figure of Thomas Bayes, whose profound insights into conditional probability and Bayes' theorem open doorways to a new realm—Bayesian statistics. Pierre-Simon Laplace takes the baton, elegantly weaving the concept of likelihood into the fabric of statistical reasoning, transcending the boundaries of knowledge. With each step, statistical theory flourishes, reaching toward the heavens of human understanding. During the Moghul period in India, which followed the decline of the Moghul Empire, important works such as Abu Fazal's *Ain-i-Akbari* provided detailed information on government departments, legal measurements, land classification, crop yields, and other statistical data. Land revenue systems and revenue guides were developed, and statistical information continued to be compiled by officials like Jag-Jivan Das and Sujan Rat Bhandari.

A Symphony of Discovery: The 19th Century Renaissance

The 19th century unfolds before our eyes as a symphony of discovery and brilliance. Witness the charismatic Sir Francis Galton as he dances through the realm of correlation and regression analysis, unraveling the intricate connections between variables and illuminating the path to predictive power. Meanwhile, the titan of mathematics, Carl Friedrich Gauss, ascends to the stage, gifting the world with the resplendent marvel of the normal distribution—a celestial symphony of curves that embraces the mysteries of nature. Let us not forget the prodigious Adolphe Quetelet, who pioneers social statistics, using the power of data to unveil the essence of humanity's collective existence. In the later British period, the decennial census was introduced in 1881 in India, aiming to count the entire population. The censuses provided invaluable information about the country, its inhabitants, and various aspects of society. The publication of the *Imperial Gazetteer of India* in 1881 and the *Statistical Account of Bengal and other provinces* further enriched the statistical knowledge base. The Directorate General of Commercial Intelligence and Statistics (DGCI&S) was established in 1905 to collect commercial statistics and promote trade and business.

The Triumph of Modern Statistics: A Mathematical Renaissance

In the grand theater of the 20th century, a resounding triumph of modern statistics unfurls. Here, towering figures like Karl Pearson and Ronald Fisher take center stage, their intellectual brilliance illuminating the path to a mathematical renaissance in statistics. Pearson's eloquent introduction of correlation coefficients and chi-squared tests resonates like celestial melodies, while Fisher's ingenious experimental designs and hypothesis testing form the pillars of statistical inference. With mathematical rigor, statistics ascends to unprecedented heights, revealing the secrets of the universe through the language of data. The period from 1930 to 1960 marked a significant phase in the growth of statistics in India. Notable figures like

P.C. Mahalanobis made substantial contributions during this time, with the establishment of institutions like the Indian Statistical Institute (ISI) and the Central Statistical Organization (CSO). These institutions played a crucial role in developing statistical methods, promoting research, and applying statistics to various domains.

The Digital Frontier: Where Data Dreams Converge

As we approach the modern era, we witness a dramatic shift in the landscape of statistics. The advent of computers catapults statisticians into the digital frontier, where the symphony of data harmonizes with computational power. John Tukey, a virtuoso of exploration, introduces us to the wonders of exploratory data analysis, guiding us through vast realms of information and unveiling hidden patterns. The statistical toolkit expands exponentially, embracing the challenges of the digital age.

Epilogue: A Tapestry Unfinished

As our odyssey draws to a close, we realize that the history of statistics is a tale forever in progress—a tapestry of endless possibilities awaiting new chapters. In an era where big data reigns supreme and interdisciplinary collaboration thrives, statistics continues to evolve, guiding humanity toward greater insights and shaping the destiny of scientific discovery. The symphony of statistics resonates across disciplines, resonating in the realm of medicine, economics, environmental sciences, and beyond. In this age of boundless possibilities, statistics holds the key to unlocking transformative insights and guiding us towards breakthrough discoveries. Let us embrace its allure and power, embarking on a journey of exploration and innovation. With statistics as our guide, we can illuminate the mysteries that lie within vast datasets, paving the way for a future where knowledge and understanding reign supreme. As the symphony of statistics plays on, let us embrace its melodies, forever inspired by the pioneers and visionaries who paved the way. Together, we can forge a path towards a brighter, more enlightened world, where the language of numbers illuminates the profound truths that shape our existence.

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Microbiology Through Ages

Microbiology, as the name suggests, is the study of minute, microscopic living entities. It includes the study of bacteria, viruses, fungi, algae, viroids and prions. Some microorganisms are useful as they help in nitrogen fixation, oxygen production etc., while some are notoriously known for their pathogenicity.

In 1665, Robert Hooke, an English physicist, first observed the dead cork cells under the microscope. Antonie Van Leeuwenhoek, a Dutch microbiologist and microscopist, observed a protozoan cell for the first time in 1674. Years later he also observed bacteria under a microscope. He is known as the Father of Microbiology.

The research in the field of microbiology accelerated after Robert Koch, Spallanzani and Louis Pasteur disproved the theory of abiogenesis, which was believed to be true by many great philosophers including Aristotle. The theory of abiogenesis stated that the living things originate from non-living things spontaneously.

Louis Pasteur, a French chemist and microbiologist contributed tremendously to the field of fermentation and pasteurization. His work also provided a deeper understanding regarding germ theory. In his experiment to disprove the theory of abiogenesis, he said, "For I have kept from them and am still keeping from them that one thing which is above the power of man to make ; I have kept from them the germs that float in the air. I have kept them from life." He also proved that the fermentation of fruit juices e.g. grapes are caused because of metabolic activity of microorganisms and it results in production of alcohol. He found that increasing the temperature of alcoholic beverages upto 62.8°C can avoid their spoilage. He also discovered that the old, attenuated cholera bacillus gives chicken its immunity against anthrax. This further led to discovery of attenuated vaccines.

Joseph Lister, a British surgeon, pioneered the application of antiseptic surgery in 1867. He is known as the Father of Modern Surgery. Robert Koch worked on growing microbial cultures and observing them under microscope to check whether they are pure. He then injected the pure culture in the animals to see if they got infected by anthrax. This led to the establishment of Koch's postulates.

Robert Koch's postulates were published in 1890 as : (1.) Microorganisms must be found in abundance in all organisms suffering from the disease . It should not be found in healthy organisms. (2.) Microorganisms must be isolated from diseased organisms and grown in pure culture. (3.) The cultured microorganisms should cause disease when introduced into a healthy organism. (4.) The microorganisms must be re-isolated from the inoculated, diseased, experimental host and identified as identical to the original specific causative agent.

Paul Ehrlich, a German physician, derived a compound from arsenic which can selectively target Syphilis. He worked with Emil Von Behring in the field of immunology to observe how blood serum with antibodies can be used to treat diphtheria. Ivanoski, in 1892, found that something minute than bacteria was able to infect the tobacco plant, as it could pass through the filter that was meant to retain the bacteria. Later on, in 1898, Beijerinck named this entity as virus. Elie Metchnikoff discovered the mechanism of innate immunity in starfish larvae. He also coined the term phagocytosis.

In 1901, Karl Landsteiner worked on distinguishing blood groups. In 1928 while working on *Staphylococcus*, Sir Alexander Fleming coincidentally discovered an antibacterial substance produced by *Penicillium*, a fungus, which inhibits the growth of *Staphylococcus*. Later, the Oxford team including Howard Florey and Ernst Chain isolated active substance penicillin from fungus *Penicillium notatum*.

Selman Waksman's research on microbes predominantly found in soil led to discovery of streptomycin, an antibiotic. Similarly Beijerinck and Winogradsky both worked on soil microbes. Beijerinck discovered symbiotic association of plants with *Rhizobium*. Winogradsky discovered a bacteria, namely *Clostridium pasteurium*, which is able to fix atmospheric nitrogen freely, i.e. without symbiotic association. He also developed a column (Winogradsky's column) which is used to study prevalence of bacteria in a variety of natural conditions.

Carl Woese worked on 16S rRNA technology which is used to classify bacteria. In 1923, David Bergey, an American bacteriologist published Bergey's Manual of determinative bacteriology which is used for identification of bacteria. In 1971, David

Baltimore established the Baltimore system of classification which is used to classify viruses according to how they synthesize their mRNA (messenger RNA).

Throughout the years, the field of microbiology has developed tremendously. Today, principles and theories of microbiology are being used in various fields like pharmaceuticals, fermentation, food and dairy, agriculture and many more. Recently, the development in microbiology helped us to tackle COVID-19 pandemic. Looking back from past to present, there are many more amazing discoveries and advancements yet to come.

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संगीत, तत्त्वज्ञान आणि दैनंदिन जीवन

मानवाच्या संपूर्ण आयुष्यात मानवावर अनेक गोष्टींचा प्रभाव पडत असतो. आजबाजला ज्या घडामोडी घडतात त्यांचा आपल्यावर कळत नकळत प्रभाव पडत असतोच. यामध्ये मानवी जीवनावर कलेचा सर्वाधिक परिणाम होतो. संगीत, चित्र, नृत्य, लेखन इ. कला आपल्या सर्वांना परिचयाच्या आहेत. या कलांपैकी माणूस संगीताशी सर्वाधिक जोडला गेलेला असतो. लहानपणी बाळाला शांत झोपवताना आई, आजी अंगाई गाऊन बाळाला झोपवतात. तेव्हापासून या संगीतकलेशी माणसाचं नातं जोडलेलं असतं. पुढे शाळेत गेल्यानंतर पाढेसुद्धा ठराविक तालावर, लयीवर पाठ केले जातात. पुस्तकातील कविता चाल लाऊन पाठ करत, त्या रोज म्हणणे हिच शाळेतील खरी मौज ! अशा कारे संगीत माणसाच्या आयुष्यात प्रवेश करते आणि प्रभावी ठरते.

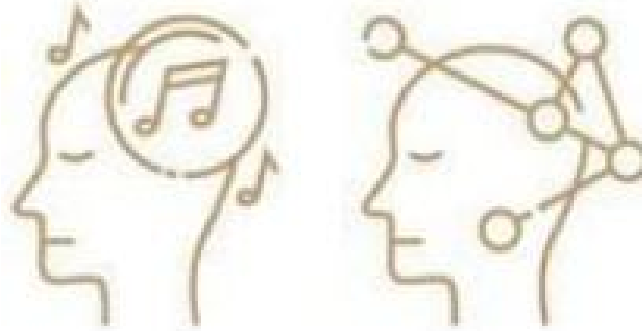
कलेचा मुख्य उद्देश हा मनोरंजन आणि अभिव्यक्ती हा असला तरीही कलाकार किंवा प्रेषक किंवा सामान्य माणूस कलेचा अनेक प्रकारे वापर करतो.

त्या प्रमाणेच संगीत या कलेचे सुद्धा सामान्य माणसाच्या आयुष्यात अतुलनीय स्थान आहे.

संगीत आणि मन :

आजच्या पळापळीच्या युगात अनेकांना मानसिक आरोग्याच्या समस्या भेडसावतात. यावर उपाय काय? यावर उपाय म्हणजे संगीत!

मानसिक आरोग्य समस्या निवारण करण्यासाठी music meditation आणि music therapy यांचा वापर केला जातो. या थेरपी नक्की काय आहेत? या प्रक्रियेत संगीताच्या waves किंवा vibration मधून वापर करून घेतला जातो.



भारतीय शास्त्रीय संगीतात वेळेनुसार म्हणजे सकाळी गायले जाणारे राग, दुपारी, सायंकाळी, रात्री गायले जाणारे राग असे वर्गीकरण केले गेलेले आहे. रागाचे moods म्हणजेच कृतीसुद्धा सांगितलेल्या आहेत. या रागांच्या गायनातून जे वातावरण तयार होते तीच या रागाची कृती असते. गंभीर, शांत, चंचल, ई. रागांच्या कृती आहेत. याप्रमाणे या शास्त्रानुसारच, संगीताच्या vibrations वरून music meditation आणि music therapy या प्रक्रिया अस्तित्वात आल्या आहेत.



MEDITATION

संगीत आणि व्यसनमुक्ती :

कामाच्या ठिकाणी असणाऱ्या तणावामुळे अनेकजण व्यसनांच्या आहारी जातात. हा तणाव कमी करण्यासाठी व्यसनमुक्ती केंद्रात देखील संगीताचा वापर music therapy द्वारे केला जातो. या therapy मुळे यशस्वी व्यसनमुक्ती होते.

आपल्यापैकी अनेकजण gym मध्ये जातात, तिथे गाणी लावलेली असतात. zumba/aerobics सारखे व्यायाम प्रकार हे संगीताच्या तालावर केले जातात.

संगीताने जोश किंवा उत्साह निर्माण होतो आणि मरगळ दूर होते, मन प्रसन्न राहते. यामुळेच गर्भसंस्कारातसुद्धा संगीताला अग्रस्थान दिले गेले आहे.



संगीत आणि दैनंदिन जीवन :

आपल्यापैकी कितीतरी जणांनी आपल्या आजीला जात्यावर दळताना ओव्या गायलेलं ऐकलं असेल. संगीताचा हा सकारात्मक प्रभाव लक्षात घेऊनच पूर्वीच्या काळी जात्यावर दळताना, ऊन पावसात शेतातील कामे करताना, गणी किंवा ओव्या गायल्या जात असाव्यात असे वाटते. जेणेकरून मनोरंजन होइलच याशिवाय कामाचे कष्ट जाणवणार नाहीत, उलट हलके होतील.

या व्यतिरिक्त संगीताचा आपल्या दैनंदिन जीवनात उपयोग होतो. आपल्यापैकी प्रत्येकाच्या car मध्ये music system असतेच. ती का असते? याची सुरुवात कशामुळे झाली? याची उत्तरे अनेकांना माहित नाहीत. याचे उत्तर म्हणजे या music system ची सुरुवात ट्रक या वाहनापासून झाली. ट्रक हे माल वाहतूक करणारे एक अवजड वाहन आहे. ट्रक प्रवासाचा पल्ला नेहमीच लांबलचक असतो. अशावेळी ट्रक driver ला झोप किंवा पेंग येऊ नये या हेतूने पूर्वी radio ठेवले जायचे. रेडिओ नंतर प्रत्येक car मध्ये music system ची सुरुवात झाली.

संगीत आणि अपव्यय :

संगीत कला असो किंवा कोणतीही कला हे एक साधन (tool) आहे. याचा वापर कसा करायचा हे सर्वस्वी मानवाच्या हातात आहे. आज मोठ-मोठ्या pubs मध्ये किंवा disco मध्ये गाणी लावलेली असतात. या गाण्यांच्या मोठ्या आवाजामुळे आणि जोराच्या तालामुळे जोराच्या तालामुळे आपण किती मद्यपान केलं ते समजत नाही. यामुळे अनेकजण जास्त मद्यपान करतात. जे आपल्या आरोग्यास हानीकारक असते. असे असले तरीही संगीताचा सकारात्मक प्रभाव हा जास्त पडलेला दिसून येतो.

संगीत आणि मी :

मी वयाच्या ८ व्या वर्षापासून भारतीय शास्त्रीय संगीत शिकण्यास सुरुवात केली. आजपर्यंत माझ्या संगीतचे शिक्षण चालूच आहे. संगीताने माझ्या आयुष्याच्या प्रत्येक टप्प्यावर अमुलाग्न प्रभाव टाकला आहे. कसाही प्रसंग असो, संगीताने माझी साथ कधीही सोडलेली नाही. एक कलाकार म्हणून माझ्या भावना मी संगीतातून व्यक्त केल्या आहेत. माझ्या गाण्याने माझ्या आजूबाजूचे, माझे मित्रमैत्रिणीसुद्धा आनंदित होतात.

संगीत आणि तत्वज्ञान :

सौंदर्यशास्त्र ही एक तत्वज्ञानाची शाखा आहे. सौंदर्यशास्त्राच्या अभ्यासात सर्व कलांचा प्रामुख्याने समावेश केला जातो. सौंदर्यशास्त्राच्या अभ्यासासाठी भरतमुनी यांचा 'नाट्यशास्त्र' हा ग्रंथ अग्रगण्य मानला जातो. या ग्रंथात संगीत, नृत्य इ. ललित कलांचे अभ्यासपूर्ण वर्णन केले आहे. त्यामुळे संगीतकला ही तत्वज्ञानाचाच एक महत्वाचा भाग आहे असे म्हणणे चुकीचे ठरणार नाही.

तत्वज्ञानात या विश्वातील अंतिम सत्य काय? हे विश्व कोणापासून निर्माण झाले आहे? यावर नेहमीच विचारमंथन सुरु असते. या प्रश्नांची उत्तरे मिळवण्यासाठी अध्यात्मिक साधनेला महत्वाचे स्थान दिले गेले आहे. अध्यात्म साधनेसाठी चित्त एकाग्र करणे महत्वाचे असते. कोणतीही कला सादर करण्यासाठी किंवा त्या कलेचा रियाज करण्यासाठी सुद्धा चित्त एकाग्रता अनिवार्य असते. चित्ताच्या एकाग्रतेतून अध्यात्मिक प्रगती साधली जाते. त्यामुळे कोणतीही कला ही एक अध्यात्मिक साधन आहे असे मानले जाते. या दृष्टीने संगीताने आपल्या जीवनातील मोठाच भाग व्यापलेला आहे, असे दिसून येते.



म्हणूनच प्रख्यात संस्कृत साहित्यकार भर्तृहरि आपल्या 'नितीशतकं' या ग्रंथात म्हणतात. जो मनुष्य साहित्य, संगीत आदि कलांपासून वंचित असतो, तो शेषूट आणि शिंगे असणारा पशुच होय. "साहित्य संङ्गीतकलाविहीनः साक्षातः साक्षात्पशुः पृच्छविषाणहीनः । तृणं न खादन्नपि जीवमान-स्तद्भागधेयं परमं पशूनाम् ॥"

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Arpita Gadgil (MA-I Philosophy)

A Short Literary Analysis of Pratimās In Ancient Sanskrit Literature

Sanskrit language occupies an important place as far as Ancient Indian literature is concerned. It has undergone a process of gradual evolution starting from Vedic Sanskrit to Classical Sanskrit covering a large timespan of nearly a millennium. Sanskrit scholar Sheldon Pollock has defined Sanskrit Cosmopolis as, “Enormous geographic sweep of Indic culture that stretched from Afghanistan through Vietnam and the East Indies and which spanned a millennium from fourth to the fourteenth century.”¹ The Sanskrit literature not just gives an account on rituals, sacrifices, philosophy, etc but it also gives a detailed account of other socio-economic and to some extent iconographic aspects as well.² Pratimās are an essential attribute in Iconography. Pratimā means an image, a statue, a figure or an Idol.³ In literature, Pratimās are seen as a figure which exhibits all the body parts and is an embodiment of a god, deity, a saint or a person; dead and alive.

सर्वा वायवदृष्ट्यत्वात् प्रतिमात्विति चोच्यते।

ईश्वरादि चतर्मुर्तीः पठ्यते सकलंत्विति ।। सप्रुभेदागम ३४.२

Even though there are numerous texts in Classical Sanskrit literature, very few provide peculiar details about Pratimās. Some of them include the legendary epics of Valmiki's Rāmāyaṇam, Vedavyāsa's Mahābhārata, and plays like Pratimā by Bhāsa as well. Even though idolworship has been the one of the important ways of worship in many sects of Hindū Religion which has spread across the vast Indian Subcontinent, the main essence of the article is to rediscover few of the Pratimās (statuettes and statues) which are mentioned in the Classical Sanskrit literature.

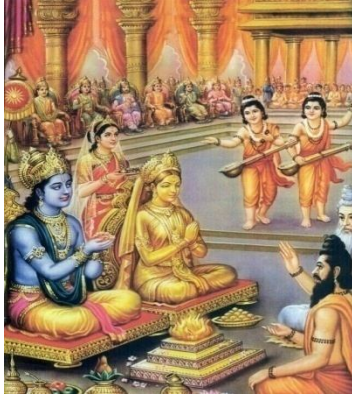
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1. Eaton, Richard M.(October 14, 2020). The Two Languages that shaped the History of India. India in a Persianate Age
 2. Sanskrit literature consists of two phases; Vedic literature and Classical Literature. Vedas, Brāhmaṇas, Āraṇyakas, Upaniṣadas, Purāṇas, Epics of Rāmāyaṇa and Mahābhārata belong to Vedic Literature whereas Classical literature comprises of plays written by renowned playwrights like Bhāsa, Kālidāsa, Bāṇabhaṭṭa, Daṇḍī, etc . Some of these classical plays are based on Vedic literature. For example-The plot of Bhāsa's PratimāNāṭakam is based upon the epic of Rāmāyaṇa by Sage Vālmiki. This type of play is called Vidagdha Mahākāvya. In these Vidagdha Mahākāvya, one can not only experience the unfelt emotions from epics, but can also notice the playwright's imagination, according to his contemporary socio-economic, political, geographic and linguistic conditions.
 3. Apte,Vaman Shivram (2020). The Student's Sanskrit-English Dictionary.(Recomposed and Enlarged Edition.Parimal Publications, Delhi.

A SHORT OVERVIEW OF AŚVAMEDHA YAJÑA FROM VĀLMĪKI'S RĀMĀYAṆAM

After returning from his Fourteen year long hermitage and a vicious war against Rāvaṇa, Lord Rāma was devoted to the welfare and prosperity of his kingdom and masses. He once asked the commoners, "What does everyone talk about in the village, about me, my brothers and my wife?"⁴ He was astounded by their reply. Sītā's loyalty towards Rāma was doubted by the subjects of Ayodhyā.⁵ Lord Rāma being an idealist, a just king, was more devoted towards the masses and unfortunately swayed by them. As a result, she was exiled and spent her days at Vālmīki's Āśrama.⁶

So, to ensure its safety, peace and prosperity, as well as to get rid of previous sins and purify the soul⁷, he performed the Aśwamedha Yajña (Horse Sacrifice).⁸ According to the Scriptures of Śrautadharmā, the Aśwamedha sacrifice was not supposed to be performed just in presence of the king and other authorities but a queen's presence was required as well.⁹ So, Sage Vasiṣṭha told Lord Rāma to cast her gold replica/statue (Pratimā) as a substitute to pass her absence during Aśwamedha Yajña.

(Exhibit 1)



काञ्चनी¹⁰मम पत्नीं च दीक्षायां ज्ञाश्च कर्मणि ।

अग्रतो भरतः कृत्वा गच्छत्वग्रे महाशयाः ॥... वाल्मीकीरामायण, उत्तरकांड ११.२५

4. उत्तरकाण्ड, सर्ग ४३, श्लोक ५,६,९,१०

5. उत्तरकाण्ड, सर्ग ४३, श्लोक १६

6. उत्तरकाण्ड, सर्ग ४५, श्लोक १४-२३

7. उत्तरकाण्ड, सर्ग ८४, श्लोक २

8. The ritual of Aśwamedha is quite complex in nature. A horse was selected, oblations were made and the horse is then set free to move, along with an army of soldiers. Those kings, kingdoms who accepted the hegemony of the king (who sends the Horse) honored the horse and paid tributes to the king and accepted their fate of (continued) being a vassal. One who is willing to challenge the might, the power of the sender king was supposed to capture the horse and confront the army.'

9. Kashikar, Chintaman Ganesh, Shrauta Dharmachi Swaropachikitsa

10 काञ्चनी - Golden, made of gold; also property and wealth.- Apte, Vaman Shivram (2020)

A SHORT OVERVIEW OF A CONSOLATORY INCIDENT (POST-KURUKṢETRA WAR)

A detailed account on the aftermath of the catastrophic Kurukṣetra war can be seen in Strīparva of Mahābhārata. Pāṇḍavas had planned to pay a visit with an aim to console Dhṛtarāṣṭra along with Kṛṣṇa, Yuyutsu and Sātyaki.¹¹ Several feelings dominated Dhṛtarāṣṭra's mind post Kurukṣetra war; a strong rage for Pāṇḍavas as they were responsible for the death of his beloved relatives, contemporaries, and acquaintances further increasing the heaps of sadness and grief. Retaliatory thoughts ruled the King's mind as he desired to avenge the death of Duryodhana by killing Bhīma.¹²

As Kṛṣṇa was aware of Dhṛtarāṣṭra's intentions he had casted an Iron Pratimā (statue) replicating brawny Bhīma. Bhīma proceeded to embrace Dhṛtarāṣṭra. Astute Kṛṣṇa realizes that Dhṛtarāṣṭra is about to kill Bhīma. Understanding the situation, Kṛṣṇa switched Bhīma with his Loha Pratimā.

संकल्पमाज्ञाया भीमं प्रत्यशुभं हरिः ।

भीममाक्षिप्य पाणिभ्यां प्रददौ भीममायसम्¹³ ॥..... महाभारत, स्त्रीपर्व अ.११, श्लो. १५



(Exhibit 2)

His doubt proves to be a reality within a few moments as Dhṛtarāṣṭra approaches and squashes the Pratimā with all the rage considering him as Bhīma.¹⁴ Old Dhṛtarāṣṭra then bled feebly through his mouth in an injured state and faints.¹⁵ As his rage receded, he had an instant regret for having retaliatory thoughts about his own nephew and he was shattered by the thought of having killed him.¹⁶ So, to take his suffering away, Kṛṣṇa informs him that the one he crushed was not Bhīma but an Iron Casting of him.

मा शुचो धृतराष्ट्र त्वं नैव भीमस्त्वया हतः ।

आयसीप्रतिमा ह्येषा त्वया निष्पातिता विभो¹³ ॥..... महाभारत, स्त्रीपर्व अ.११, श्लो. २३

A SHORT OVERVIEW OF BHĀSA'S PRATIMĀNĀṬAKAM

The Pratimānāṭakam is one of the legendary plays from Bhāsa's Nāṭakachakram. Roots of this play trace back to Ayodhyākāṇḍ from Valmīki's Rāmāyaṇa. Though it is based on Valmīki's Rāmāyaṇa it has fictional undertones created by Bhāsa which are centered around Bharata. The central theme is quite tragic as it shows the aftermath of King Daśaratha's death, posing an illusion of Kaikeyī's love and highlighting the harsh reality. The character of Kaikeyī has been depicted as quite agathokakological in nature by Bhāsa.

First act of the play begins with preparations of Rāma's coronation and Kaikeyī's astute demands which creates a catastrophe in the coming time. As Bharata is at his maternal home up there in Kekeya, he is totally unaware of the havoc in Ayodhya. On his way back to Ayodhya, he rests at an unknown Pratimāgrha bearing statues of deceased kings from Ikṣvaku clan. Statues of Dilīpa, Raghu, Aja and Daśaratha are to be seen there. Bharata, shocked and disheartened by seeing Daśaratha's statue beside his late grandfather Aja's, asks if the statues of alive kings were erected as well. He gets indubitably stunned as soon as he knows that Dasaratha is no more ^{17 1}

1 11. स्त्रीपर्व अध्याय १२, ९ श्लोक १, २

12 अध्याय १२, श्लोक १३

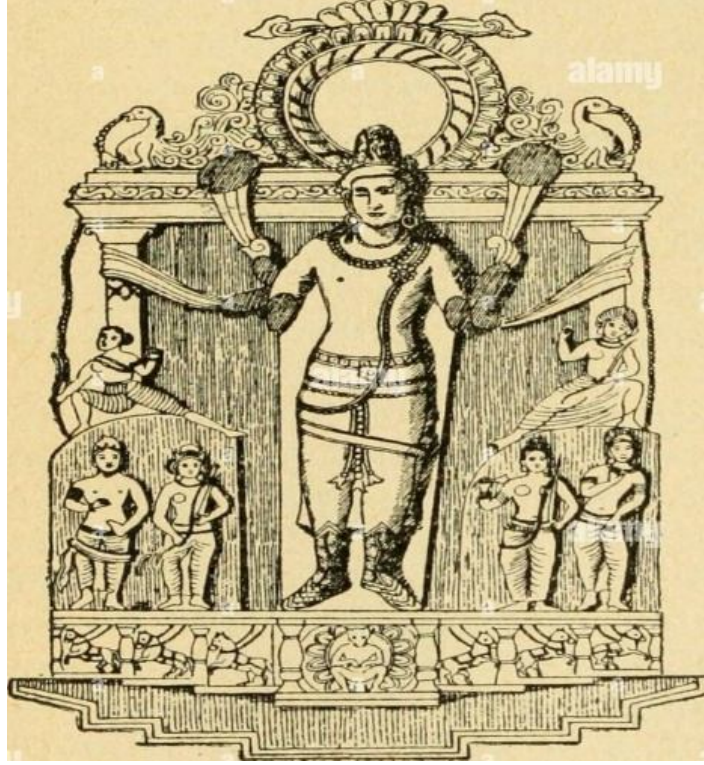
13. आयसम (आयसी f.) - Made of iron, iron, metallic; also an armor for the body- Apte,Vaman Shivram (2020)

14 . स्त्रीपर्व अध्याय १२, श्लोक १७

15 .---- अध्याय १२, श्लोक १८

16.. अध्याय १२, श्लोक २१, २२

17 . अङ्क ३, श्लोक ९



(Exhibit 3)

भरतः- अहो कियामाधुर्ये पाषाणानाम्¹⁸ । अहो भावगतिराकृतीनाम । दैवतोद्दिष्टानामपि मानुषविश्वासतासां प्रतिमानाम् । किं नु खलु चतुर्दैवतोऽ स्तोमः। प्रतिमानाटकम् अङ्क् ३

Bhāsa in few words has summarized the details and skill of craftsmanship which brought the statues into existence. These statues were carved out of stone and they looked like they were representing a group of deities. He has described the statue of Daśaratha as greater in height than the royal mansion of Ayodhyā, which symbolizes his lofty attitude. No one paid any kind of respect or salutation to these Pratimas. The Pratimāgṛha was open to all, it had hardly any restrictions nor large numbers of visitors. The travelers were the only visitors and they were not restricted by any authorities.¹⁹

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2 18. पाषाण- A stone- Apte, Vaman Shivram (2020)

19. अङ्क् ३, श्लोक १३

Conclusion

All the Pratimās mentioned above provide contemporary socio-cultural, and psychoanalytical evidence to some extent. Reasons behind erection of these three Pratimās might differ but a similarity is to be seen in incidents of Rāmāyaṇam and Pratimānāṭakam as they represent an absentee character of the story. The incident in Mahābhārata differs as it makes clear that Bhīma was present when he was replaced by his Pratimā. In short, the Pratimās replace the characters they are erected for.

Even though Rāma sent Sītā to an exile, a sense of regret and separation persisted in his mind. A regret for not maintaining his beloved's dignity, a regret for doubting her character. Not only in the present era but in the past as well a golden statue symbolizes prestige, a sense of immense honor and hence the reason for casting a golden Pratimā of Sītā could be owing a sense of respect, an apology towards her. It can also be deduced that in the vedic period, both men and women had equal rights in rituals and customs of Yajña, as no sacrifice was complete without the presence of Yajamān's wife.

Bhīma has been depicted as an epitome of strength as he was blessed with the might of ten thousand elephants by Nāgendra Vāsuki when he was thrown into the river with treachery by Duryodhana. Nonetheless, Dhṛtarāṣṭra too, was blessed with the might of One Hundred Thousand Elephants by his biological Father Sage Vyās, after realizing that he was going to be born blind. Though being blind, Dhṛtarāṣṭra was mightier than Bhīma. Thus, to save Bhīma from Dhṛtarāṣṭra's clutches of retaliation, Kṛṣṇa had to cast a Pratimā strong enough to idolize Bhīma and to sustain Dhṛtarāṣṭra's strength as well.

Literature of not only Sanskrit but many languages have always depicted iron as a symbol of might, bravery, boldness. These qualities show an immense similarity with Bhīma and hence that could be the reason for casting an iron statue of Bhīma.

It seems that Bhāsa has carefully taken empirical sciences into account. He has described that the statues were carved out of stone. Since centuries, empirical sciences have proved that metals like iron and copper when exposed to an open environment are prone to corrosion.

Since these statues were yet to be seen by the future generations, Bhāsa considered their durability and hence penned down that the statues were made up of stone neither gold nor copper or Iron.

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for the students.**