

The Science behind Dance

Dr. Vidhi Nagar
Assistant Professor (Kathak Dance)
Dept. of Dance, Faculty of Performing Arts
Banaras Hindu University
Varanasi – 221005, U.P.

Key Words: Science, Dance, Cancer, Classical, Therapy.

INTRODUCTION

Dance is a fundamental form of human expression that likely evolved together with music as a way of generating rhythm. The science of dance involves the existence of science in dance and of course its implementation in the same. One of the first scientific approaches that can be seen today is that dance is being used as a therapy especially for arthritis, obesity, mental and cancer patients. It has been seen and proved that music and dance have brought positive changes in the treatment of patients undergoing chemotherapy. Many cancer centres are offering dance therapies as a combined treatment to that of their scheduled routine treatments.

Dance is an art that generally involves movements of the body; often rhythmic and to music. It is sometimes used to express an idea or tell a story. **Dance is an art which gradually change your personality, confidence and immunity level of your body.** It is a rejuvenating element due to which one can say that dance is related to science.

According to some scholars long back there is no difference between art and science. Later differences started to be found between the two and even later people started to differentiate between the art itself; classifying them as visual arts , Performing arts and Theatre as well as *Deshi* and *Margi*.

PHYSICS

(A) The sound that comes when we stamp feet on the floor is definitely related to science because 'Sound' is found in 'Physics'. Here we can see that **Newton's III law** applies:

“Every action has an equal and opposite reaction”

The action is that a force has been applied on the floor and the reaction is that a sound is created.

(B) **Sir Isaac Newton's** definition of gravity is defined as a force that attracts any object towards the centre of the Earth.

For example, when a dancer jumps in the air, dancer automatically gets back to the ground. The science behind this is that dancer gets back to the floor due to the law of gravity. Dancer cannot stay in the air constantly and is brought back to the ground.

(C) Equilibrium in physics is the same as main one's balance in dance.

(D) 'Time' and 'Speed' in Physics as the same as '**Taal**' and '**Laya**'.

(E) Displacement in dance is the distance which moved by a dancer on stage. Displacement seen in Physics too.

MATHEMATICS AND GEOMETARY

- (A) In dance, the counting of matras definitely related to science where the figures are used.
- (B) The science behind taking spins/chakkars in dance in the thermo of circle where the dancer open his/her hands at 180° while taking chakkar. When the dancer takes a chakkar, turns 360° upon himself/herself. Hands are kept at 45° and 90° also. Use of lines; vertical, diagonal. They are imaginary lines that do exist. The dancer creates a space for himself.
- (C) The science behind dividing the artists equally on both sides of the stage is the line of symmetry which arts as a mirror line in this case.
- (D) **Statistics:** Permutation and combination of artists where the artists are nearly of the same height during a choreographic work.

BIOLOGY

The science behind rasa and bhava is such that when a dancer performs on stage, his/her actions reach the audience and the chemical substance is released in the body of the viewer causing a biological change. The audience reacts to the performance due to the neuron chemicals called endorphins that the human body releases. Even the same applies to the dancer.

NEUROLOGY

Neuroscientists have long studied isolated movements such as ankle rotations or finger tapping. From this work we know the basics of how the brain orchestrates simple actions. To hop on one foot never mind patting your head at the same time requires calculations relating to spatial awareness, balance, intention and timing, among other things, in the brain's sensor motor system. In a simplified version of the story, a region called the posterior parietal cortex (toward the back of the brain) translates visual information into motor commands, sending signals forward to motion-planning areas in the premotor cortex and supplementary motor area. These instructions then project to the primary motor cortex, which generates neural impulses that travel to the spinal cord and on to the muscles to make them contract. At the same time, sensory organs in the muscles provide feedback to the brain, giving the body's exact orientation in space via nerves that pass through the spinal cord to the cerebral cortex. Subcortical circuits in the cerebellum at the back of the brain and in the basal ganglia at the brain's core also help to update motor commands based on sensory feedback and to refine our actual motions. What has remained unclear is whether these same neural mechanisms scale up to enable manoeuvres as graceful as, say, a pirouette.

PHYSIOTHERAPY AND ACCUPRESSURE

The Science behind these two being used in dance is such that the movements that a dancer does act on some points of the body. These in turn create positive vibes in the dancer's body. Making well in his/her social being. Now days, dance therapy is being used as a complimentary therapy in clinical cancer centres due to the fact that dance acts like an anti-emetic (which is used after a chemotherapy) In dance therapy, movement interaction is utilized to attain therapeutic goals. This therapy helps in enhancing emotional-physical unity of individuals, effecting changes in feelings, cognition and physical functioning. It can be modified to suit a wide range of diagnostic categories; the mentally challenged, physically disabled, slow learners, emotionally disturbed, the visually and hearing impaired, children with cerebral palsy and autism, etc

GEOLOGY

Geology is the study of interior and exterior properties of the Earth. The science behind being used in dance is that there is the depicts rocks, mountains in a dance performance.

MINEROLOGY OF GEOLOGY

The science behind the jewellers worn by the dancers is that those jewellerys have been of minerals (precious stones/gems and metals) have an impact on the human body. For example odishhi dancers wear silver jewellerys and silver keeps body calm.

Long back, in ancient times, dancers use to wear gold jewellerys with 'Emerald' stones. Gems are known to increase the immunity system, reduce infection and acts as a cancer therapy. Emerald is known to be able to decrease negative energy transform into positive energy. Pearls are known for their curative powers and sapphire for stabilising the mind, keeping the mind cool and calm . Diamond jewellery always give energy and high confidence level with speech quality to the dancer. It has one more quality- it attracts the peoples.

ARCHITECTURE

Architecture being a subject related to arts, it can be clearly seen that science is involved in the pre-production of a sculpture. Sculptures are in three dimensions (3 D). Mathematics and Geometry are involved in the designing and sculpture-making of statues. Measurements have had to be taken make the sculptures proportionate to each other. Furthermore, these postures seen in the dance. In **Odishi dance**- you can visualise the figure of dancer is just like as temple, sculptor or a portrait.

PAINTING

Paintings are in two dimension and colours used to make the paintings consists of chemicals which is also considered as being a science. This can be seen in dance also. For example , An erotic scene and a Raas painting, the scenario can used in a dance performance.

HAND GESTURES

Dance, is looked at in a broad perspective, is definitely related to science and it can be linked at several level. Furthermore, the aral hasta employed in classical dances, for example in Kathak, changes the vibes of the human body if seen from a scientific point of view. The explanation for this is, the thumb is considered as being positive and the forefinger as being negative, hence when joined together (as it the case in aral hasta), the positive gets in touch with the negative and continuous practise, it helps in establishing the vibes and turning the negative into positive hence bringing positive changes in the body.

CONCLUSION

Moreover Mathematics being a scientific subject sheds much on the science of dance. Mohiniattam , a classical dance form of Kerala, uses Kinetic movements ,Bharatnatyam dancers take squared stances, Kathak dancers uses angles in its movements. Lines are drowns in space. The Dance creates a space for himself and indulges in dancing using imaginative lines, vertical, diagonal straight lines. The spins that a kathak dancer takes a purely angular because dancers takes a complete spin over himself/herself, covering 360'. Dancer opens his/her hands at 180'. The implementation of science can

be seen. It since long been such a practise to dance in that way but with the advancement in time, one starts realising the science behind it.

The positioning of artists on stage is the same as the positioning of points on a figure. The combination and permutation of **statistics** is the same as combination of artists whereby all artists have to be nearly of the same height. The distance moved on stage by a dancer is the displacement in **Physics**. The equal distribution of artists on each side of the stage involves the line of symmetry which acts as a mirror line. Line of symmetry is used in **Mathematics**.

It has been observed that dance can cure diseases. Statistics show that patients have benefited a lot from dance therapies and dancers who practise regularly are fit and fine. The energy of Mother earth gets in the body when the dancer stamps his/her feet on the ground. This brings positive changes, signs and effects in the human body.

Dance acts as an **acupressure** and as a **physiotherapy** element on the human body. The points in the feet relating to various part of the human body send signals to the connecting parts and these acts a healing element in the human body. The science behind this is that one is relaxed; it reduces stress, fear, anxiety, depression. It decreases chronic pain, isolation and body tension leaving one healthy and happy, Art and dance find their roots linked to science.

References:

1. Article: Recent brain-imaging studies reveal some of the complex neural choreography behind our ability to dance : Steven Brown and Lawrence M. Parsons
2. My Body My Wisdom : Tripura Kashyap
3. Article: Dance Therapy : Dr. Vidhi Nagar
4. Newspaper: The Times of India : 25th October, 2005