

DANCE GEOMETRY IN THE STAGE FLOOR PARAMETERS: THEORY AND PRACTICE QUESTIONS

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Abstract. The author analyses the problems of dance geometry, which are on the verge of choreographic direction and artistic scenography. The search for a geometric form of dance is always connected with the stage space, which has to be solved each time anew in a performance. Considering the geometric features of the stage space and perspective spatial constructions, the author refers to the functioning of dance in it, showing the methods of its development using various examples from ballet performances. The most typical methods of the compositional organisation of dance in the geometric-spatial structure of the stage - the box, which is traditional to this day, are revealed. The lexical component of the choreography involved in the spatial definition of ballet performance is analysed. Based on specific staging solutions, ballet mise-en-scenes are analysed, creating their own spatial and bodily geometry that falls into the stream of the viewer's attention. The author also considers modern choreographic practices focused on avant-garde trends and the media environment, creating new choreography and visual space. It is concluded that the geometry of dance is a dynamic system of non-verbal communication, the unit of which is the image fixed in the movements of the human body, set by stage parameters. The methodological basis for creating a spatial composition on the stage plan is a stage direction, forming the necessary visual impression. The development of the spatial language of classical dance is based on the choreographer's ideas about movements in a particular fragment, where each element is endowed with its logic and system of geometric construction.

Keywords: *dance geometry, dynamics of actors' groups, scene planner, stage space, choreographic concept.*

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1. Introduction

The term “geometric form of dance” in our study refers to the direction of movement on the stage, interconnected with the geometry of the dance itself, together with the general spatial solution of the ballet performance. It includes what the artist puts together on the stage: scenery and costumes, and everything that forms the spatial body of the performance, which is built according to the laws of visual perception. On the one hand, these are the plastic possibilities of the cast, without which the spatial composition of a dance work is generally impossible since the actor is its module. On the other hand, these are the technical stage capabilities and the theatre architectural space, which must meet the dynamic capabilities of the human body, and the architecture of both the building as a whole and the stage itself, which has a decisive influence on the figurative structure of the performance.

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Even though there are studies in the theory of theatrical art, including works on scenography, which touch upon aspects of stage composition, the relationship between the dynamics of dance movement and the stage plan as a director's intention was practically not considered.

The study's relevance lies in the study of the interaction between the stage and spatial environment of the theatre, with the direction of movement and the geometry of dance, in the interaction of which an essential compositional, figurative and ideological characteristic of a choreographic work is revealed.

This article aims to give a comprehensive idea of the search for the geometric form of dance in the space of the stage, taking into account the aesthetic and stylistic features of choreographic solutions and experiments in the world of ballet theatre. The study is limited to the study of the features of dance geometry, which forms stable compositional links with the stage plane and is localised in the functional zones: proscenium, downstage, center stage and upstage.

2. Materials and methods

The study material was ballet performances of both ancient and modern choreography, staged on the stages of Russian and foreign theatres, video recordings and photographs of scenes from performances and choreographic numbers, Russian and foreign periodicals, graphic sketches and sketches. Most of the sources in their content and methods are at the intersection of areas of knowledge (theatre, art history, geometry) and the subject field of research itself.

The work uses the method of complex integrative analysis, which made it possible to study the geometry of dance in the ballet theatre as an interrelated phenomenon, to divide the general problem posed into parts for its specific consideration from the standpoint of scenography, choreographic direction and ballet performance. Patterns of the mechanisms of the spatial solution of the performance and its structural features.

3. Literature review

As a science of artistic and technical patterns in creating the spatial imagery of performance, scenography has attracted many researchers. Different aspects of the organisation of the theatre stage space and various stylistic trends in the development of the artistic design of the performance were considered by such authors as Gvozdev, (1931), Etkind, (1974), Pozharskaya, (1970), Syrkina, (1978), Kostina, (2002), Berezkin, (1997), etc. However, the ballet theatre is not singled out separately in these works. We find questions about the compositional structure of dance in the reflections of famous choreographers and teaching aids by Zakharov, (1976), Smirnov, (1986) in the literary memoirs of Petipa, (2003), Fokin, (1962), Lifar, (1995), Bejart, (1989), an interview with Cranko, (1978) and others. J. Noverre noted in *Letters on Dance*: "Some knowledge of geometry can also be beneficial: they will lead to distinctness in figures, to order in combinations and to clarity in forms; by shortening the lengths, they perform greater precision (Noverre, 1986). In several articles presented in the format of conferences, there is an attempt to find the aesthetics of classical choreography with a mathematical paradigm in separately considered aspects (Alibova, 2015, Erovenko, 2015, Vychuzhanova, 2019, Filimonov, 2021). Several authors find many connections between mathematics and dance, both in practice and theory. So, Belcastro and

Schaffer (2011) talk about the many ways to solve choreographic problems, considering them in the context of mathematical possibilities. Francesca Falcone considers the evolution of the arabesque in classical dance in connection with the dance master Carlo Blasis, thanks to whom it acquired a new meaning on stage: as a position of the body based on geometric balance. Bernard Freyberg (2014) follows the same path, combining mathematical affinity with a fundamental aesthetic desire, and comparing mathematical categories with choreographic ones. Colin Counsell (2006) thinks about the kinesics of infinity in connection with the ideas of Laban, the geometry and metaphysics of dancing space. Nevertheless, with the existing developments, a specialised analysis of the geometric forms of dance on the scale of the stage space, taken in a complex format in art history, has not yet been carried out.

4. Results

Stage platforms in the ballet theatre and their features

The stage space in the theatre is a box, bounded at the bottom by a stage tablet, at the top by grates, and walls on three sides, as a result of which the viewer can see the action taking place inside the stage. This removed fourth wall ends in an architectural portal that limits and focuses our vision (Fig.1).

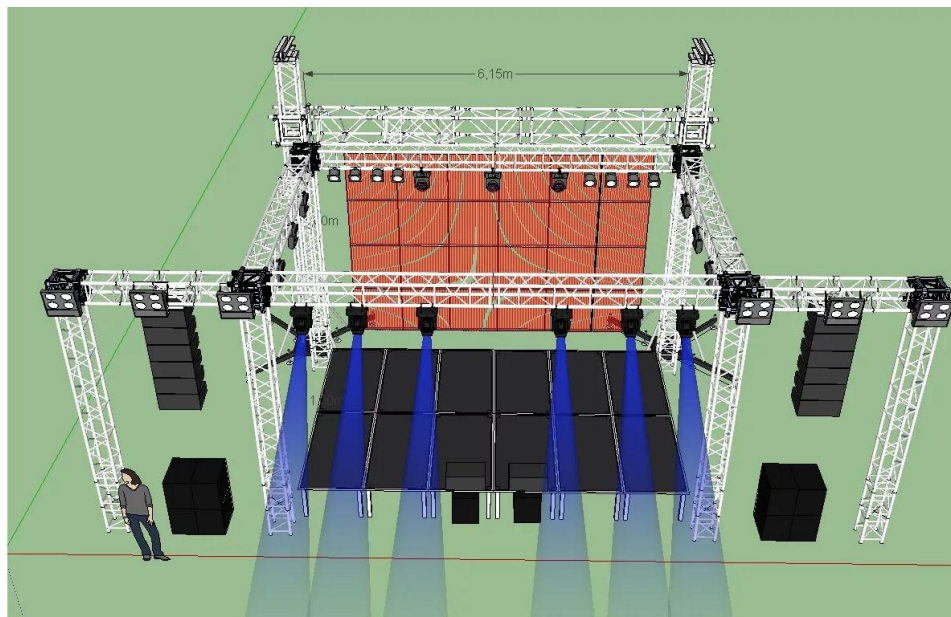


Figure 1. Stage structure

The portal is a kind of frame that decorates the scene. Schematically, the floor plan of a traditional theatre is perceived as a rectangle located in a horizontal direction (Fig. 2).

In open areas, its shape can take the form of a semicircle or a circle in the form of a stage - arena. The optics of the human eye is such that it tends to limit the picture they are considering, bringing together the general plan, moving from the general to the particular, to the details, from the general to the medium and close-up. On the way to overcoming the space, the viewer modulates their perception of themselves in the form of geometric shapes—the famous theatre critic N.M. Tarabukin wrote: “the architecture of the building with its scene of action and places for spectators is a function of the

stage forms of the performance” (Tarabukin, 2013). Accordingly, considering the history of buildings and styles of theatrical performances, we can single out one or another function that they carry in themselves. Speaking about the most common type of stage venue - the box stage used in the ballet theatre, one must keep in mind not only its everyday use - the viewer, looking as if into a fourth transparent wall, can use all the theatrical techniques that the historical theatrical experience has provided us. The peculiarity of the arena stage is that the viewer becomes, as it were, a upstage, part of the design, a living backdrop on which the actor works. In this case, large, heavy decorations are inappropriate, and light openwork structures are assumed (Fig. 3).



Figure 2. La Scala Theatre. Milan portal scene



Figure 3. Stage project with an amphitheatre in Fatyanovsky Park. G. Vyazniki

In choreographic performances performed in a natural environment, it must be taken into account that architecture and the natural landscape are the backgrounds for the ongoing action, but the upstage with its history and biography, which already subconsciously affects the viewer.

Geometric features of the stage space

Since the space in our view can be a cube or a truncated ball, we will consider how we can designate the volume of this space and show the viewer its real three-dimensionality. If the cube is based on a square, then all sides of the cube are inherent in the patterns of perception of the geometry of the square. The force zones of the cube will be its centre and the points of the vertices of its edges. When combined, four diagonals are formed: from left to right, up and in-depth; from right to left up and at the same time in-depth; from left to right down and out of the depth; right to left down and out of the depths. These diagonals in the construction of dancing groups on the stage have practical meaning, and they can be defined as active and passive diagonals. Since our eye moves from left to right, in considering this diagonal, the kinetic force of the movement of our eye is already embedded.

Significantly, all kinds of these diagonals were used by many artists in paintings and theatre direction. Conceptually, this diagonal conveys tension, overcoming obstacles, and conquest. Thus, the paintings by V. Surikov, “The Conquest of Siberia by Yermak” or “Barge hauliers on the Volga” by I. Repin, are built along such an active diagonal. In the ballet “Spartacus” by A. Khachaturian, many battle scenes have a similar diagonal direction.

Another diagonal, called a passive or a forced departure diagonal, is used on the canvas “Boyar Morozova” by V. Surikov. The Wilises line up along such a diagonal in the ballet “Giselle” by A. Adam and go back (Fig.4).



Figure 4. Ballet Giselle. 2nd act. Diagonal Willys

The next diagonal of the apparition or entrance is often used in icons and altar paintings. The biblical scene “Annunciation” by many masters is comprehended based on this diagonal. The same example of its use can be seen in A. Ivanov’s painting “The Appearance of Christ to the People”. Similarly, the characters of performances in ballet variations appear on the stage in front of the eyes of the audience, coming out from behind the curtains: (The Lilac Fairy - “Sleeping Beauty” by P. Tchaikovsky, Raymond - “Raymonda” by A. Glazunov, Gamzatti - “La Bayadère” by L. Minkus, etc.) (Fig.5).



Figure 5. Ballet Don Quixote. Saratov Opera and Ballet Theatre

Another diagonal is a demonstration diagonal, which represents an ongoing event. According to this principle, V. Surikov’s painting “The Capture of the Snow Town” was built. Perhaps this type of diagonal movement is the most common in the compositional construction of acts and scenes of a ballet performance: S. Prokofiev’s Stone Flower, I. Stravinsky’s The Firebird, L. Minkus’s Don Quixote, etc.

In addition to the geometry above of diagonal directions and the examples are given, in most cases, in one choreographic work, their combination is found, just as in one picture and one fragment of the performance, their synthesis can be observed.

Perspective spatial constructions in dance

On the stage, the stage director and artist have to solve the problems of organising the first, central and long-range plans in the same way as a perspective is built in a painting. A.G. Rappaport, analysing intersubjective space, notes: “Space is presented either as a kind of reservoir, emptiness, endless light or dark ether.... Such a space is empty, isotropy and formless..” (Rappaport, 1982). A perspective building that wanted to subordinate all objects in the picture plane to a single logic appeared in the Renaissance. A vanishing point was identified - an abstracted, mathematical value located on the horizon line. At this point, the lines of perspective construction converged. As a result of this technique, three plans were formed, which at first seemed somewhat distorted. The first, near, was unnaturally enlarged, the center stage was close

to natural visual perception, and the third, far, was too small. Many artists later used this illusion of depth to create an endless, surreal space. This method has spread in the theatre. Renaissance theatre artists usually placed the horizon line on the backdrop that closed the stage's space. The vanishing point of the lines was at the junction of the backdrop with the tablet (Fig 6).



Figure 6. Olympic Theater designed by A. Palladio. 1580

The Italian architect and artist S. Serlio (1457-1552) corrected the spatial perspective by moving the horizon beyond the limits of the stage, significantly raising the vanishing point. All the scenery lines standing on the floor, on the sides of the stage, should have been reduced to this point. The backdrop itself had its vanishing point, located in the centre of the scenery. This innovation, combined with the sloping stage plan, allowed considerable depth in a small space. The landscape and architectural scenery mastered by the ballet theatre in the 18th century still actively use this spatial illusion of depth in P. Tchaikovsky's *Swan Lake*, L. Minkus' *La Bayadère*, and J. Schneitzhoffer's *La Sylphide*. In modern choreography, the staging principles of perspectivism are used in ballets: *The Flames of Paris* by B. Asafiev, *Esmeralda* by C. Pugni, *Romeo and Juliet* by S. Prokofiev, *Angara* by A. Eshpai, and the *Seven Beauties* by K. Karaev, etc. Thus, the converging streets of Verona Square in the scenery for the ballet "Romeo and Juliet" (Bolshoi Theatre., set design by P. Williams, 1946) convey a clear perspective of Italian architecture. Chiaroscuro contrasts architectural volumes with carefully traced details to create a recognisable image of the Renaissance era, which is necessary for the overall historical style of the performance (Fig 7).



Figure 7. P. Williams Sketch of scenery for the ballet Romeo and Juliet. 1946. Bolshoi Theatre

The compositional technique of the Versailles Park symmetrically going into the depths in the ballet *The Flames of Paris* (Bolshoi Theatre., set design by I. Utkin and E. Monakhov, 2008) was achieved thanks to an ideally built drawn perspective with a gradual lightening of the horizon. The sloping ramp from the stage plane to the scenery, together with the colour monochrome, creates a gradual transition to the open entrance to the park through an illusory image.

If the image is revealed to the viewer in the above examples and the Renaissance paintings, our eye seems to enter the depicted space. Then, like Western European medieval art and the ancient Russian icon, ballet theatre uses a reverse perspective. The swans' lines are rebuilt in diagonal directions in the ballet *Swan Lake*. One of them is angular, fixed in the downstage by the dominant figure of Prince Siegfried, with the ends of the swan formations diverging to the sides. As we have seen, in the first case, diagonal constructions from left to right and vice versa deepen the scene. In the second, they actively direct the main character toward the viewer. It seems to float, penetrating inside us (Fig. 8).



Figure 8. Ballet *Swan Lake* Choreography by V. Burmeister. The angular construction of swan groups. Musical Theater named after Stanislavsky and Nemirovich-Danchenko

If in European painting, the center stage became the main one, and in icon painting - the first one, then in a ballet performance, it can be unchanged in rare cases due to development over time. In the show of the events of the ballet "The Nutcracker" by P. Tchaikovsky, the downstage is predominantly a kind of decorative frame that introduces us to action, deployed in the picture plane. The second plan is dominant. Here, the main events take place with Masha and the Nutcracker. However, at the beginning and end of the performance, the downstage enters the main level of perception along the allotted narrow strip with the curtain closed. As if on a frieze-like elongated relief, the fairy-tale heroes of the mouse kingdom pass before the audience.

Geometrics of dance in stage space

Finally, let us dwell on one more aspect of the geometric form of the construction of the dance, on the configuration of the figures of the dancers themselves lined up on the stage. A.G. Rappaport, reflecting on an object in space, says: "An object is thought of as something definite, limited, and its boundary, occupying some place in space attracts our attention precisely from the point of view of its form and its parts' arrangement in space. (Rappaport, 1982). There are many approaches to organising movement, space and form of choreographic work. Various formations and rearrangements of performers in stage dance are not just their formal movements on the stage board. Each movement consists of separate elements, is divided into constituent structures, and must be verified according to the trajectory and execution mechanism. The field of mass dance drawing can have different contours and external outlines. It can be simple and complex, symmetrical, asymmetric or dissymmetric, one-dimensional and multidimensional. In addition, it also depends on the size of the scenes, which can be large or small. You can see how in the ballets of the ancient choreography *The Sleeping Beauty* by P. Tchaikovsky, *Paquita* by E. Deldevez, and *Coppélia* by L. Delibes, in all the scenes, the multifaceted geometry of dance groups is drawn, based on the symmetry of the refined pattern of movements that fill the entire depth of the stage and express the corresponding feelings and moods of a sizeable monumental performance. J. Balanchine is different. The linear ensemble constructions of the dance refer us to classical architecture with the poetics of the rhythmic alternation of precisely adjusted colonnades.

Another important expressive component of dance geometry is *mise-en-scene*, which fixes the static arrangement of several dancers on the stage, showing the interactions between them. Although *misanthropy* is not the dominant technique in a choreographic work, and the static arrangements of dancers on the stage appear as short-term episodes, these thoughtful constructions can contain a vital idea containing a richly expressive and visual potential. J. Balanchine, as a design engineer, creates *mise-en-scenes* in one-act ballets: "Apollo Musagete", "Orpheus", and "Agon" by I. Stravinsky. The profile picture, consisting of three dancers and one dancer in the ballet's finale, forms no ordinary quartet. The classic arabesque pose with successively stretched legs to ever greater heights in *Apollo Musagete* fits mathematically exactly into a circle, making one recall Leonard's man. The drawing of this *mise-en-scene* became a symbol of the solar god Apollo with divergent rays (Fig. 9). Critics called J. Balanchine's choreography "abstract" and his composed compositions - the "algebra" of ballet art. *Mise-en-scene* deployed by certain angles turns and poses in front of the viewer create their own spatial and bodily geometry, visible and readable by the viewer.



Figure 9. Mise-en-scène from the ballet *Apollo Musagete*. Choreography by J. Balanchine. Mariinskii Opera House

Geometrics in the avant-garde directions of modern dance has a different specificity. Between 1925 and 1926, Oskar Schlemmer and Rudolf von Laban published a text with complete motion diagrams. in *Man and Figure*, based on the theory of the human body, art and space. (Stanger, 2021). The Bauhaus theatre saw the emergence of a new mechanical dance genre that emphasised the intense personal experience of Oskar Schlemmer. (Lahusen, 1986). Nicolas Salazar Sutil, in his article “Mathematics in Motion: A Comparative Analysis of the Stage Works of Schlemmer and Kandinsky in the Bauhaus”, reveals the general methodological techniques in terms of the pollination of ideas from the visual to the performing arts, considers the influence of compositional techniques based on methods derived from figure drawing, as well as the study of form and geometry in the stage production. (Sutil 2012). The American choreographer W. Forsyth is called the creator of quantum choreography (Fig. 10). “He verifies the mechanics of movements to incredible accuracy, which allows the performers to build clear geometric trajectories - both to move the whole body and its centres” than harmony; “Air sylphs mastered the laws of gravity and the infinity of the nine spheres; princes and princesses, in search of the centre of gravity, moved each other with effort in space, risking losing the vertical and balance. Pointe shoes turned into screws, screwing into the floor with crazy speed. The romantic spirit of the ballet heroes turned out to be in search of a body in real-time and space”.

If the composition of a classical ballet performance is aimed at showing the action and events taking place on the stage, then modern choreography, on the contrary, takes the viewer’s perception beyond the boundaries of the performance, including the latest technical elements of lighting, projection and computer design into the visual environment of the dance. On the one hand, such an approach correlates with the new trends in the choreographer’s cognitive abilities. On the other hand, it is connected with the requirement for an active perceiving position of the viewer.



Figure 10. Ballet in the Middle, Somewhat Elevated. Parisian opera. Choreography by W. Forsyth

5. Conclusion

As we can see, starting from the geometrical features of the stages, the mastered perspective constructions on the stage plane to the spatial structures in the dance itself and its compositional geometry, one can observe the dual function of its understanding. Geometrics in the dance space is simultaneously a box for dancing with specific parameters of the stage and the material and means of creating an artistic image. The search for a geometric form of dance on the scale of the stage space is an integration of bodily, psychological and spiritual energy. Composition, range, mechanics and amplitude of movements, the direction of the lines of the body, light rays on the stage, and abstractness of the content, all these are various variants of geometric parameters aimed at the transformational process in the ballet theatre with the help of individual creative manipulations of various choreographers.

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