

# **COMPARATIVE ANALYSIS OF BAHRAM GUR'S CORPUS PROPORTIONS IN SHAHNAMEH TAHMASBI WITH KHAMSA NIZAMI (NATIONAL LIBRARY OF PARIS; NO: 1956)**

## **ANALISIS PERBANDINGAN PROPORSI KORPUS BAHRAM GUR DALAM SHAHNAMEH TAHMASBI DENGAN KHAMSA NIZAMI (PERPUSTAKAAN NASIONAL PARIS; NO: 1956)**

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### **Abstract**

*During the Safavid era, the painting tradition involved proportional systems such as the golden ratio and irrational numbers. This article explores the use of irrational numbers to analyse the body proportions of Bahram Gur, a key figure in the painting. We also examine the coordination of geometric motifs in the Shahnameh Tahmasabi and Khamsa Nizami manuscripts to understand how these systems were employed in creating human figures. Our research aims to reconstruct the principles behind the harmonious proportions of Bahram Gur's figure in these paintings. By conducting investigations and calculations, we found that the proportions of Bahram Gur's body in both manuscripts frequently exhibited irrational numbers, without being tied to a specific image or theme*

**Keywords:** figure proportion, bahram gur, shahnameh tahmasabi, khamsa nizami, golden proportions.

### **Abstrak**

*Selama era Safawi, tradisi seni lukis melibatkan sistem proporsional seperti rasio emas dan angka irasional. Artikel ini mengeksplorasi penggunaan angka irasional untuk menganalisis proporsi tubuh Bahram Gur, tokoh penting dalam lukisan tersebut. Kami juga menelaah koordinasi motif geometris dalam manuskrip Shahnameh Tahmasabi dan Khamsa Nizami untuk memahami bagaimana sistem ini diterapkan dalam penciptaan figur manusia. Penelitian ini bertujuan untuk merekonstruksi prinsip-prinsip di balik proporsi harmonis figur Bahram Gur dalam lukisan-lukisan tersebut. Melalui penyelidikan dan perhitungan, kami menemukan bahwa proporsi tubuh Bahram Gur dalam kedua manuskrip sering kali menunjukkan angka irasional, tanpa terikat pada gambar atau tema tertentu.*

**Kata kunci:** proporsi figur, bahram gur, shahnameh tahmasabi, khamsa nizami, proporsi emas

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## 1. INTRODUCTION

The complexity and precision of geometry, proportion, composition, and coherence in the Safavid period's illustrated paintings present difficulties in comprehension today, as their distinct visual language has been forgotten and occasionally utilized. In pictorial works, it is not possible to achieve a unified and non-contradictory picture of the function of Iranian painting in the Safavid period. Various and separate research; in different ranks and degrees; In the field of hidden geometry, the proportions of the human figure and the composition and geometric structure of Iranian paintings have been done. In the studies related to the figure proportion, the usual proportions, such as the head-to-body ratio, have been generally discussed.

The painting style of the Safavid era incorporated various important proportionality systems, such as the golden proportion (1:0.618) and the use of irrational numbers to depict the king. The proportions used in Bahram Gur's figure in this article are based on (1:1+ $\sqrt{2}$ ), (1:  $\sqrt{2}$ ), (1:  $\sqrt{3}$ ), and (1:  $\sqrt{5}$ ). In the mentioned manuscript, there is a specialized professional system that patterns formed human proportions. The key to depicting the other paintings lies in portraying the king in the painting.

The principal aim of this research is to find the system of proportion and geometry of drawing Bahram Gur's body in Tahmasabi's Shahnameh and Military Khamsa. The major goal encompasses various sub-goals, which are; Measuring the proportions of the parts of Bahram Gur's body and multiple types of proportions in it and finding out how to combine several systems of proportions in the image of the king, extracting the formulas of the proportions in the pictures centred on Bahram

Gur's body in two manuscripts and comparing them analytically.

This research seeks to find an answer to this key question: How is the process of proportionality system and the geometry of drawing used in the portraits of Bahram Gur illustrated in Shahnameh Tahmasabi compared to Khamsa Nizami? It tries to answer the following sub-questions:

Is the fit of Bahram Gur's body specific to one image and theme, or are these composition and corpus proportions used in other images of that manuscript as well? Are the proportions of Bahram Gur's corpus different in the different images of Tahmasbi's Shahnameh and Military Khamsa, or do all the images related to Bahram Gur's corpus in these two books have their own proportional and geometrical system?

Does the depiction of Bahram Gur's corpus depend on the specific style of each artist and his method, or does it follow an equal system and a single tradition? Did the composition and proportions of Bahram Gur's figure in unique books of the same period have definite and identical visual rules, or did they differ from one version to another?

Papadopoulos<sup>1</sup> (1979), in the book "Islam and Muslim Art"; which is one of the first attempts to reveal the hidden geometry and composition of Islamic painting, defines the use of spiral forms and spirals. By analyzing the structure of a significant number of images of Maqamat Al-Hariri, he shows that in all these images we see complex spirals that are used to organize the images. Papadopoulos has tried to assign a curve-based structure to Iranian paintings, but achieving comprehensive theories and obstacles in this field requires deeper and more analysis.

In the book "The Two Worlds of Middle Eastern Book Illuminations" (2011), Nazarli<sup>2</sup> investigated the hidden geometry and hidden proportions of Tabriz school paintings, relying

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<sup>1</sup> Papadopoulos, Alexandre, *Islam and Muslim Art*, 1979.

<sup>2</sup> Nazarli, Mais, *The Two Worlds of Middle Eastern Book Illuminations*, 2011.

on Sufism. He also mentions the use of various golden ratios in Iranian paintings. By focusing on one of Shahnameh Tahmasabi's paintings titled "Presenting Gifts from India", he tries to reveal that all the proportions in the painting are in harmony with the proportions of the main element of the painting, which means "King", and the overall composition of the painting is also based on the king's proportions.

Efthemi, Tavousi, Ayatollahi, and Nobri<sup>3</sup> (2007), in their article titled "Human Proportion in Achaemenid Art, Case Study: Reliefs on the Stairs of Apadana Hall, Persepolis"; Human proportions in the Apadana relief motifs have been studied and analyzed using geometric methods of size transfer to determine the ratio of different figure proportion. The authors have compared the findings with the ideal proportions of Leonardo da Vinci and finally with the human proportions in the Egyptian and Mesopotamian art of Greece.

The results of this article show a kind of distinctive human fitness; It has a corpus height ratio of 1/14. Shah Kolahi<sup>4</sup> (2018), in her article entitled "Examination of human figures in the works of Junaid al-Sultani based on the illustrated version of three masnavis of Khwajo Kermani (stored in the British Museum under number 18113)", has introduced three types of figure painting in the works of Junaid. According to some of his predecessors, Junaid drew the figures of kings and princes from a specific model, namely "the figure of kings and princes with a height equal to 7 heads", which has its roots in Iranian literary and painting traditions; has benefited. This pattern can be seen with changes in the "body of guards and hunters with a height equal to 6 heads" and "the figure of slaves with a height equal to 8 heads". Masoumipour, Farrokhfar<sup>5</sup> (2019), in his article entitled "De structuring in the human proportions of the characters of Shahnameh Tahmasbi"; analyzes the human proportions in

the paintings of Shahnameh Tahmasbi and concludes that the head length of the positive and main characters in the paintings is either proportional to the body or larger, and the head length of the secondary characters of the story is smaller than the body. Henry (2015), in the article A Review of "Islamic Geometric Design"; which is devoted to the review of the book "Islamic Geometry Patterns" written by Eric Brug; compared and analysed Broug's method in drawing the classic figure of eight with the more traditional method of star pattern. He also refers to the principles of design and polygon grids and each of the main geometric patterns: Four feather design, six feather design, and Five feather design. In the other part of this article, more wrapped designs and irrational numbers ( $\sqrt{2}$ ,  $\sqrt{3}$ ,  $\sqrt{5}$ ) are examined. Nicholson<sup>6</sup> (2019), in "Leonardo da Vinci, The Proportions of the Human Figure (After Vitruvius)"; examines the proportions in one of Da Vinci's works, the Vitruvian Man. He began the study of anatomy in 1489 and refined the proportions inspired by the drawing of Marcus Vitruvius. He argued that the proportions of a temple should reflect the proportions of the human corpus. Fletcher<sup>7</sup> (1883), in his speech entitled "Human Proportion in Art and Anthropology"; examines calculating the proportions of the human body, which started in Egypt and also existed in Greece; and assigns and refers to the proportions provided by Leonardo da Vinci.

## 2. METHODOLOGY

According to the subject of the research, the current type of research is descriptive-analytical with a comparative approach. The data has been collected by the library method and then the analysis of the pictures has been done. After collecting the required images and information, comparisons and conclusions have been made by analyzing the works and data.

<sup>3</sup>Efthemi, Tavousi, Ayatollahi, and Nobri, "Human Proportion in Achaemenid Art", 2007.

<sup>4</sup> Shah Kolahi, "Examination of human figures in the works of Junaid al-Sultani based on the illustrated version of three masnavis of Khwajo Kermani", 2018

<sup>5</sup> Masoumipour, Farrokhfar, "De structuring in the human proportions of the characters of Shahnameh Tahmasbi ", 2019.

<sup>6</sup> Nicholson, "Leonardo da Vinci, The Proportions of the Human Figure (After Vitruvius)", 2019.

<sup>7</sup> . Fletcher, "Human Proportion in Art and Anthropology" 1883.

### 3. RESULT

#### Comparison of Body Proportions of Bahram Gur in Two Manuscripts

The comparative analysis of the anatomical proportions of Bahram Gur's figure in the selected illustrations from Shahnameh of Shah Tahmasp and Khamsa of Nizami revealed both significant similarities and patterned variations across the two manuscripts. A total of 43 anatomical proportions were extracted and analyzed from the selected paintings. Among these, 16 proportions were found to be completely identical between the two manuscripts.

A key finding is that irrational numbers are dominantly used to define the body part ratios of Bahram Gur in both versions. Frequently recurring irrational proportions include:

$$\frac{1}{\sqrt{10}}, \frac{1}{\sqrt{50}}, \frac{1}{\sqrt{7}}, \frac{1}{\sqrt{32}}, \frac{1}{\sqrt{3}}$$

These values consistently appear across different body parts, such as the ratio of the head to full body, head to upper/lower body, upper to lower body, hand to forearm, and foot to leg.

In instances where irrational numbers were not employed, specific rational values such as 0.5, 0.8, and 0.9 were used instead, suggesting a consistent underlying system of measurement or symbolism rather than arbitrary artistic choice.

A breakdown of key proportional findings includes:

- **Head to full body:**  $\frac{1}{\sqrt{32}}$  and  $\frac{1}{\sqrt{50}}$  are each used **twice** across the manuscripts.
- **Head to upper body:**  $\frac{1}{\sqrt{3}}$  appears once in Shahnameh of Shah Tahmasp and twice in Khamsa of Nizami; 0.5 is used once in both versions.

- **Head to lower body:**  $\frac{1}{\sqrt{10}}$  occurs **twice** in Khamsa of Nizami and **three times** in Shahnameh of Shah Tahmasp.
- **Upper body to lower body:** The proportions **0.5**,  $\frac{1}{\sqrt{2}}$  and  $\frac{1}{\sqrt{3}}$  each appear once in both versions.
- **Hand to forearm:** 0.9 is used once,  $\frac{1}{\sqrt{3}}$  once, and  $\frac{1}{\sqrt{7}}$  appears **twice** in Khamsa of Nizami and once in Shahnameh of Shah Tahmasp.
- **Foot to leg:**  $\frac{1}{\sqrt{32}}$  is used **three times** in Khamsa of Nizami and once in the Shahnameh of Shah Tahmasp.

Although the external features of Bahram Gur such as age, facial structure, and body mass vary from image to image, the underlying proportional logic remains stable, indicating a consistent design system likely rooted in symbolic, philosophical, or workshop traditions. These results suggest that the portrayal of Bahram Gur adhered to a visual canon, in which the use of irrational numbers served not only aesthetic but potentially metaphysical or ideological functions as well.

### 4. DISCUSSION

#### Shahnameh of Shah Tahmasabi

The version of Shahnameh of Shah Tahmasabi has 258 illustrations. Miniaturists, Illuminators, Calligraphers, Margin drawer, and painters of that time contributed to objectifying it.<sup>8</sup> In another source, the number of paintings is mentioned as 256. The miniatures of this version are not uniform in terms of quality and skill in drawing.<sup>9</sup> The Shahnameh of Shah Tahmasabi is known as the Shahnameh of Hotun. The most magnificent project done in the Tabriz school is the Safavid period. The author of the work is unknown. Some paintings are in the Metropolitan Museum and some are in Iran. The size of the effect is (318.470) square millimeters. During the period of turning away from art education,

<sup>8</sup> canby, Iranian painting, 84.

<sup>9</sup> Grabar, An overview of Iranian painting, 103-104.

Shah Tahmasab presented this Shahnameh to the Ottoman sultan Salim II in 975 Ah. Painters such as Sultan Muhammad, Mirmsur, Aghamirak, Dost Muhammad, Mirza Ali, Mozafarali, Sheikh Muhammad, Mirsaid Ali and Abdul Samad were involved in it. The implementation of this version started at 930 Ah and was completed a little before 946 Ah. The main management of these manuscripts was written by Sultan Muhammad, who at least supervised the first hundred pages. Then Mirmosour supervised the other part of the work. In the illustrations of this Shahnameh, a unique and conscious grace, the quality of color, and the coherence of the composition are evident.<sup>10</sup>

#### **Khamisa Nizami manuscript of the National Library of Paris, number 1956**

The manuscript of Khamisa Nizami contains 282 sheets of (360.250) mm. It contains 57 single-page illustrations 6 double-page illustrations and 63 illustrations. The year of its completion is 968 Ah. Its calligrapher is Khairullah bin Hossein Kalabi Shushtri, and the illustrator is Mr. Bahram Qoli Afsha. It is kept in the eastern branch of the National Library of Paris. Its identification number is 1956 and the place of production is Shushtar, Qazvin, Shiraz. The completion date of the entire book is 968 Ah.

Of the painters, it is clear that only Bahram Qoli Afsharake was a painter of two-page paintings. The supporter of the book is Qasim Ali Sultan, who ruled Shushtar in 966-967 Ah. The version was also created in the same year. Considering that the calligrapher is a Shushtri, it seems that because Qasim Ali Sultan came to the sovereignty of Shushtar on behalf of Shah Tahmasb; he took advantage of such a promotion and ordered this illustrated kheshmeh.<sup>11</sup>

Considering that Shushtar does not have a known history of the book layout, it is possible that the copy was calligrapher in Shushtar and the copy was taken to another country for the production of illustrations. Sabzevar, Shiraz, Tabriz, Herat, and most importantly Qazvin, which was the capital, and the possibility of painting in this city is more, he pointed out.<sup>12</sup> Bahram Gur: Bahram is a king who is connected with myth in history, and the creation of many myths and legends about him indicates the importance of Bahram in the eyes of Iranians. In history, Bahram Gur is a prince who was "raised by Numan Malik Hira in Qasr Khornaq and ascended the throne with the support of Munzar bin Numan." It was decided that the fight between Bahram and Khosrow over the royal throne would be ended in such a way that they would place the crown between two lions and each of the two rivals who took it would be the king, and Bahram was successful.<sup>13</sup>

Bahram Gur has always been a brave man and a skilled and agile angler in the literature and painting of the Middle Ages of the Middle.<sup>14</sup> Bahram Gur, who appears at the end of the mythical period of Iran; It takes on the characteristics of gods. Most of all, he brings the perfections of Wareh Targhna (God of Victory) alive and perfect. "He is not only an earthly king, but a hero in the traditional sense of epics; Often a demigod, or at any rate, the manifestation of an active divine principle with a glorious mortal face. As Mircea Eliade says: global mythology tends to transform the multiple complexity of the actors of history into great examples of heroic actions that take on the aspect of sanctity with the help of legends. In this way, Ferdowsi and later Nizami, through his various images, reveal the face of the ancient Iranian god who is hidden under the mask of Bahram Gur.<sup>15</sup>

<sup>10</sup> Agenda, Painting School of Tabriz and Qazvin-Mashhad ,95.

<sup>11</sup> Mirzaei Mehr, Criticism of Ganjai Military Khumseh paintings, 14.

<sup>12</sup> Mirzaei Mehr, Criticism of Ganjai Military Khumseh paintings, 16.

<sup>13</sup> Pirnia, Complete History of Iran,213.

<sup>14</sup> Polyakova, Rahimova, Iranian painting and literature, 207.

<sup>15</sup>Barry, commentary on Haft Paykar Nizami, 77.

The image of Bahram in Shahnameh and Haft Pekir is different, and the two poets' perception of Bahram's life is also different. Ferdowsi looks at Bahram's life from a heroic aspect, but Nizami has created an artistic work that teaches the secret of living and loving life. Introducing the featured images from the two examined manuscripts: This section showcases the selected pictures. These two manuscripts contain 24 depictions of Bahram Gur. Six examples have been analyzed from three suitable pictures of Khamsa Nizami and three pictures of Shahnameh Tahmasbi, which have similar themes in the two manuscripts. Shahnameh Tahmasbi and Khamsa Nizami have similar selected topics. Next up, we will discuss Bahram Gur's hunting adventures with his companions. The last selected topic is related to the killing of a legendary creature by Bahram Gur (Table 1).

The method of analysing the corpus: The posture of the figure is kept constant in each picture and the proportions are examined in the same posture as in the composition of the work. The size of the figure is increased in proportion to the picture frame. To compare the proportions, first the important parts of the body are determined and then those proportions are determined. The existence of the desired parts is different in relation to the state of the body in each image. The proportions of the "head" have been calculated without taking into account the details of the lawyer's clothes and... The obtained numbers for the ratios are considered with the approximation of one decimal place. The important parts of Bahram Gore's body that have been investigated and calculated; It includes the size ratio of hand to forearm, head to whole body, head to upper body, head to lower body, upper body to lower body and foot to leg (Table 2).

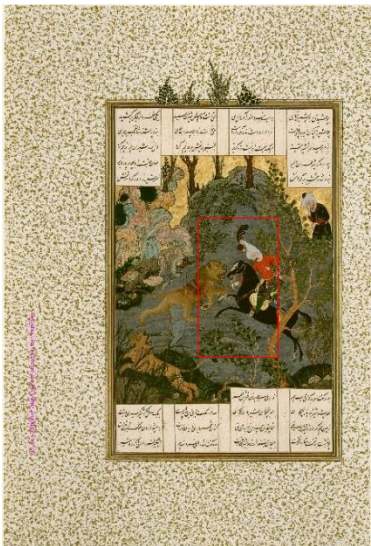

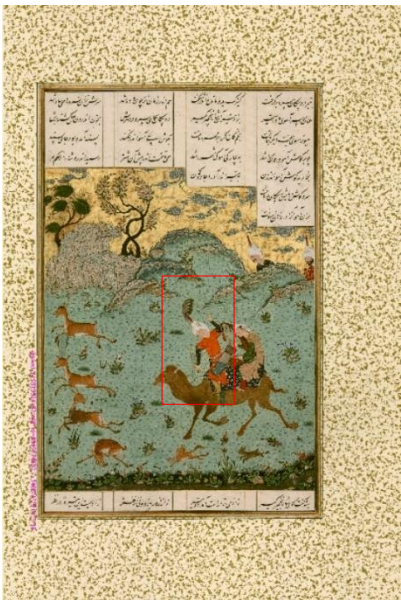
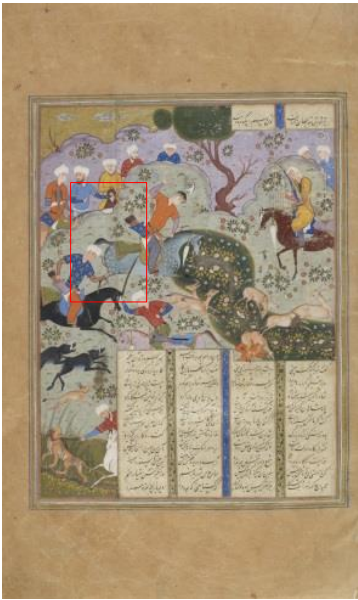
### **Comparison of body proportions of Bahram Gur in two manuscripts**

By examining the numbers obtained from these calculations, the results show that in 43 proportions of Bahram Gur's drawing organs in the selected paintings of the two studied manuscripts; 16 items are completely similar. In both versions, irrational numbers are used for most proportions of body parts. Among the common Irrational numbers in the pictures, we can refer to:  $1/(\sqrt{10})$ ,  $1/(\sqrt{50})$ ,  $1/(\sqrt{7})$ ,  $1/(\sqrt{32})$ , and  $1/(\sqrt{3})$  Even where Irrational numbers are not used; They have specific and common numbers. In some proportions, numbers 0.5, 0.9, and 0.8 have been used instead of irrational numbers. Therefore, the proportions of the body parts and their ratio to the whole body in both paintings are orderly and are designed with precise calculation. Bahram Gur's face, body fat thinness, and age are different in all the pictures of both versions. In the ratio of "head to the whole body: in both versions, the number  $1/(\sqrt{32})$  is used twice and the number  $1/(\sqrt{50})$  is used twice. In the ratio of "head to the upper body" in Khamsa Nizami twice and in Tahmasabi's Shahnameh, the ratio  $1/(\sqrt{3})$  is used once, in both versions, the number 0.5 is used once. In the "head to lower body" ratio, the number  $1/(\sqrt{10})$  is used twice. It is used in the Khamsa Nizami version and three times in Tahmasabi's Shahnameh.

In the "upper body to lower body" ratio, the numbers 0.5,  $1/(\sqrt{3})$ , and  $1/(\sqrt{2})$  have been used once in both versions. In the "hand to forearm" ratio, the number 0.9 is used once, the number  $1/(\sqrt{3})$  once, the number  $1/(\sqrt{7})$  is used twice in Nizami Khamsa and once in Tahmasabi's Shahnameh. Regarding "foot to leg",  $1/(\sqrt{32})$  is used three times in Nizami's Khamsa and once in Tahmasabi's Shahnameh (Table 3).



**Table 1.** Introduction of selected illustrations from two manuscripts of Shahnameh Tahmasbi and Khamse Nizami with identification code.

Shahnameh Tahmasbi <sup>16</sup>	Khamse Nizami <sup>17</sup>
	
<p>Image code: (1S)- Bahram Gur hunting a lion.p. 573 Canby:2011,251</p>	<p>Image code: (1K)- Bahram kills the lion and the onager with an arrow.P. 139 v. Khamse Nizami</p>
	

<sup>16</sup> Canby, The shahnama of shah tahmasp the Persian Book of Kings,2011.

<sup>17</sup> <http://archivesetmanuscripts.bnf.fr/ark:/12148/cc588801c>.

Code:( 2S)- Bahram takes his musician hunting.  
P.550 v, Canby: 2011, 244.

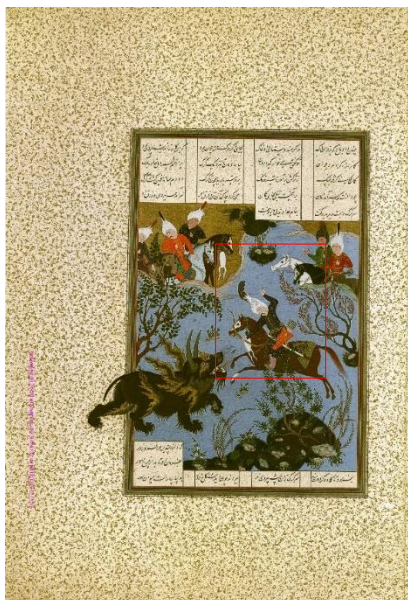


Image code: (3S)- Bahram Gur kills the  
rhinoceros.P. 586 r, Canby: 2011, 254.

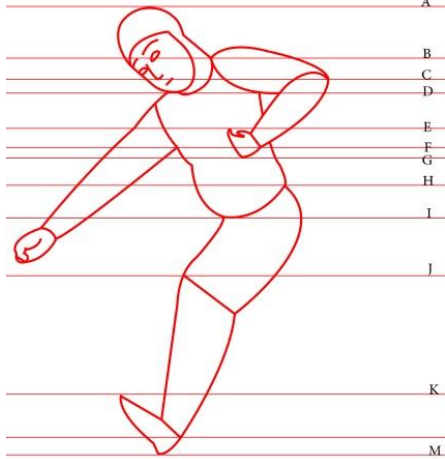
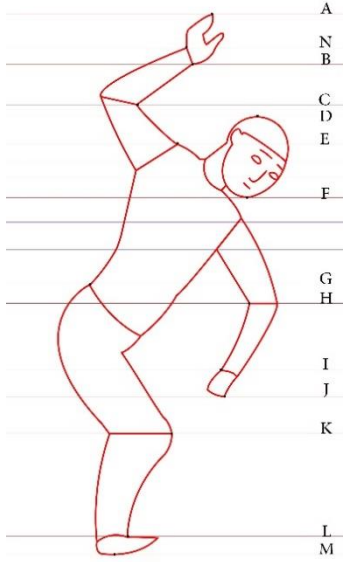
Image code: (2K)- The story of Bahram with his maid.  
P. 146 r. Khamsa Nizami

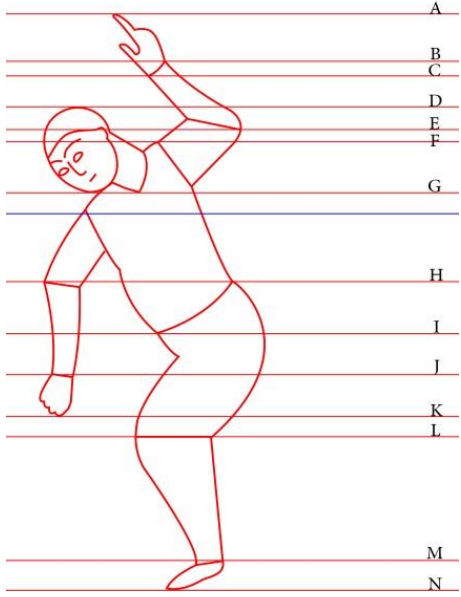
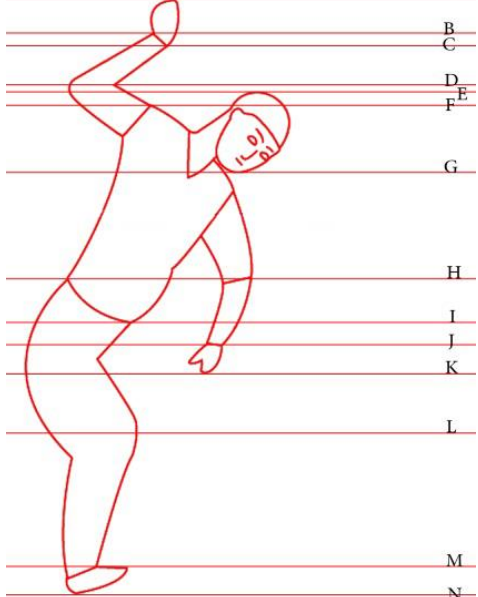
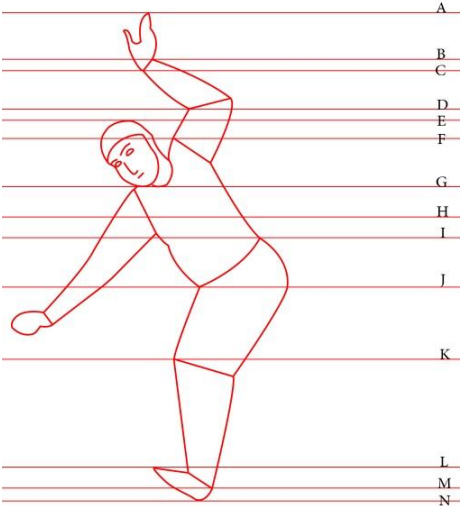
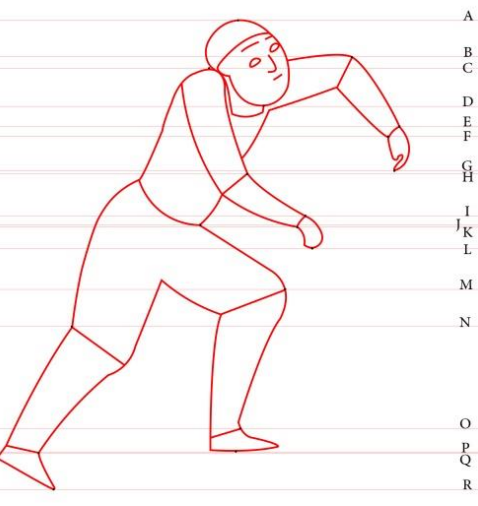


Image code: (3K) Bahram Gur kills the dragon and  
finds the treasure. P. 140 r. Khamsa Nizami



**Table 2.** Comparison of the figure of Bahram Gur illustrated in Shahnameh Tahmasabi and Khamsa Nizami

Shahname Tahmasbi	Khamsa nizami
	
<p><b>Image code: (1S)</b></p> <p>hand to forearm: <math>\frac{EG}{CF} = 0.4 \approx \frac{1}{\sqrt{7}}</math></p> <p>head to whole body: <math>\frac{AD}{AM} = 0.2 \approx \frac{1}{\sqrt{32}}</math></p> <p>head to upper body: <math>\frac{AD}{BI} = 0.5</math></p> <p>head to lower body: <math>\frac{AD}{HM} = 0.3 \approx \frac{1}{\sqrt{10}}</math></p> <p>upper body to lower body: <math>\frac{BI}{HM} = 0.6 : \approx \frac{1}{\sqrt{3}}</math></p> <p>foot to leg: <math>\frac{KM}{JL} = 0.1 \approx \frac{1}{\sqrt{50}}</math></p>	<p><b>Image code: (1K)</b></p> <p>hand to forearm: <math>\frac{AB}{NC} = 0.8</math></p> <p>head to whole body: <math>\frac{DF}{AM} = 0.1 \approx \frac{1}{\sqrt{50}}</math></p> <p>head to upper body: <math>\frac{DF}{EG} = 0.6 \approx \frac{1}{\sqrt{3}}</math></p> <p>head to lower body: <math>\frac{DF}{GM} = 0.3 \approx \frac{1}{\sqrt{10}}</math></p> <p>upper body to lower body: <math>\frac{EG}{GM} = 0.5</math></p> <p>foot to leg: <math>\frac{LM}{KL} = 0.2 \approx \frac{1}{\sqrt{32}}</math></p> <p>hand to forearm: <math>\frac{IJ}{HI} = 0.4 \approx \frac{1}{\sqrt{7}}</math></p>

	
<p><b>Image code: (2S)</b></p> <p>hand to forearm: <math>\frac{AC}{BE}=0.9</math></p> <p>head to whole body: <math>\frac{DG}{AN}=0.1 \approx \frac{1}{\sqrt{50}}</math></p> <p>head to upper body: <math>\frac{DG}{FI}=0.4 \approx \frac{1}{\sqrt{7}}</math></p> <p>head to lower body : <math>\frac{DG}{HM}=0.3 \approx \frac{1}{\sqrt{10}}</math></p> <p>upper body to lower body: <math>\frac{FI}{HM}=0.7 \approx \frac{1}{\sqrt{2}}</math></p> <p>foot to leg: <math>\frac{MN}{LM} = 0.2 \approx \frac{1}{\sqrt{32}}</math></p> <p>hand to forearm: <math>\frac{JK}{HJ}=0.5</math></p>	<p><b>Image code: (2K)</b></p> <p>hand to forearm: <math>\frac{AC}{BD} = 0.9</math></p> <p>head to whole body: <math>\frac{EG}{AN} = \frac{3.3}{24} = 0.1 \approx \frac{1}{\sqrt{50}}</math></p> <p>head to upper body: <math>\frac{EG}{FI}=0.4 \approx \frac{1}{\sqrt{7}}</math></p> <p>head to lower body: <math>\frac{EG}{HN}=0.2 \approx \frac{1}{\sqrt{32}}</math></p> <p>upper body to lower body : <math>\frac{FI}{HN}=0.7 \approx \frac{1}{\sqrt{2}}</math></p> <p>foot to leg : <math>\frac{MN}{LM}=0.2 \approx \frac{1}{\sqrt{32}}</math></p> <p>hand to forearm: <math>\frac{JK}{HJ} 0.4 \approx \frac{1}{\sqrt{7}}</math></p>
	

<b>Image code: (3S)</b> hand to forearm: $\frac{AC}{BD} = 0.6 \approx \frac{1}{\sqrt{3}}$ head to whole body: $\frac{EG}{AN} = 0.2 \approx \frac{1}{\sqrt{32}}$ head to upper body: $\frac{EG}{FJ} = 0.6 \approx \frac{1}{\sqrt{3}}$ head to lower body: $\frac{EG}{IN} = 0.3 \approx \frac{1}{\sqrt{10}}$ upper body to lower body: $\frac{FJ}{IN} = 0.5$ foot to leg: $\frac{LN}{KM} = 0.3 \approx \frac{1}{\sqrt{10}}$	<b>Image code: (3K)</b> hand to forearm: $\frac{EG}{BF} = \frac{1}{\sqrt{3}}$ head to whole body: $\frac{AD}{AR} = 0.2 \approx \frac{1}{\sqrt{32}}$ head to upper body: $\frac{AD}{CJ} = 0.5$ head to lower body: $\frac{AD}{JR} = 0.3 \approx \frac{1}{\sqrt{10}}$ upper body to lower body: $\frac{CJ}{JR} = 0.6 \approx \frac{1}{\sqrt{3}}$ foot to leg: $\frac{OP}{MO} = 0.2 \approx \frac{1}{\sqrt{32}}$ foot to leg: $\frac{QR}{NQ} = 0.3 \approx \frac{1}{\sqrt{10}}$ hand to forearm: $\frac{IL}{HK} = 0.6 \approx \frac{1}{\sqrt{3}}$
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**Table 3.** The ratio of numbers used in body proportions of Bahram Gur

kinds of proportions	A dominant number
head to the whole body	$\frac{1}{\sqrt{50}}, \frac{1}{\sqrt{32}}$
foot to leg	$\frac{1}{\sqrt{32}}$
head to lower body	$\frac{1}{\sqrt{10}}$
upper body to lower body	$\frac{1}{\sqrt{2}}, 0.5, \frac{1}{\sqrt{3}}$
hand to forearm	$0.9, \frac{1}{\sqrt{7}}, \frac{1}{\sqrt{3}}$
head to upper body	$0.5, \frac{1}{\sqrt{7}}, \frac{1}{\sqrt{3}}$

## 5. CONCLUSIONS

By examining the proportions of Bahram Gure's corpus in each of the paintings considering all the calculations made in the selected pictures and then comparing the findings of the two manuscripts; About the process of the proportionality system, the geometry of drawing in the pictures of Bahram Gur's figure illustrated in Shahnameh Tahmasbi compared to Khamseh Nizami, it can be concluded that in the body proportions of Bahram Gur's figure in all the pictures of the two manuscripts, Irrational numbers are the

most frequent. The proportions are based on these numbers. Why is it important to use dumb numbers in Bahram Gur's organ composition components? It's because of their characteristics.

An irrational number is a number that has infinite decimals. Everyone knows natural numbers, but a number that has countless numbers next to it; has greatness and shows the infinity that takes us to the infinity of God. Numerical numbers are numbers to express the truth and a meaning beyond mathematical calculation, unlike natural numbers, which take the thought to infinity and bring to mind the greatness and vastness. The reason for using these numbers in the proportions of the "Bahram Gur" figure is an important character and main hero of the present paintings is "King"; Bahram" He is the king - warrior.

In Khamsa Nizami and Ferdowsi's Shahnameh, Bahram Gur is a warrior king who has a hunting spirit and this spirit can be seen in all aspects of his life. Hunting animals such as lions and onagers, and fighting two lions, is related to his mythological character. He is a hunter who is constantly on the move. He always wins the field. Bahram Gur is not just an earthly king; The features that the average person lacks lead him to be a hero and a demigod. So, Bahram Gur if as king; If the shadow of God is on the earth, the proportions of his body parts should also include the characteristics and proportions like the world

and the attributes of God, including greatness.

The proportion of the Bahram Gure corpus is not specific to one image and theme, and this type of composition and body fit is also used in other images of that edition. But the appearance characteristics, including youth or old age, obesity and thinness, in each picture; It is specific to that work and it differs from other illustrations in the same edition and other books, and it seems that it is either because of the synchronization of the story and the image, or it depends on the type of narration received by the illustrator, or it is related to the artistic style. Be specific to the artist.

The composition and size proportions in the design of Bahram Gur's figure in both versions show similar features and make this hypothesis probable that in the painting of the Safavid period, there were predetermined patterns for the portrayal of the main characters of the image and also; Some specific drawing traditions and rules were transferred from Shahnameh Tahmasabi to the Nizami manuscripts, and thus, with the precision in the proportions of Bahram Gur's body parts and his presence as an important element in the composition of the paintings, it increases the possibility that the main proportions of Bahram Gur's body has certain visual rules with slight changes, which in various books of a period, regardless of the type of workshop (court or local) and the theme of the paintings; Is respected.

In the composition of paintings, the figure of Bahram Gur can be considered an important element of the paintings, which plays a key role in the composition of the whole picture, and it is drawn bigger than the rest of the figures in the picture. The body proportions of Bahram Gur probably have a conventional and symbolic shape, whose body and aesthetic characteristics are almost stable.

In the two reviewed manuscripts; The figure of the king has always played a central role in the structure of the composition and is drawn bigger than other figures and with a more beautiful and brighter dress than other courtiers. He can be identified with a crown, which shows his power and importance, in all situations, including the administration of judicial courts, battles with enemies, or recreation and entertainment; Because all the details of the composition are planned toward inducing his lofty position.

### Research Further

For future research, it is recommended to explore the proportions examined in this study within additional manuscripts from the Safavid period, allowing for a broader understanding of how these proportions were applied across different versions from that era.<sup>18</sup>

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<sup>18</sup> This article is derived from the Master's thesis of Nastaran Tanhaei-Vash under the supervision of Dr. Hanieh Nikkhah. While the thesis examined all 24 existing illustrations of Bahram Gur in the two manuscripts (9 from the Shahnameh of Tahmasp

and 15 from Nizami's Khamsa), this article focuses on a selected sample of 6 illustrations (3 from each manuscript) for comparative analysis.

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