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**POSSIBILITIES TO DETERMINE THE  
MEDIUM RATIO IMAGES OF SEVERAL  
SHAPES USING DIGITAL TECHNOLOGY**

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# POSSIBILITIES TO DETERMINE THE MEDIUM RATIO IMAGES OF SEVERAL SHAPES USING DIGITAL TECHNOLOGY

(Determination and Drawing Technique of the Moose-like  
racehorse of medium ratio image)

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**Abstract-** Despite the different descriptions of Mongolian horses in Mongolian Fine art and Design, the real and definite Mongolian horse image has yet been unclear. We have not yet found the scientifically explained Mongolian horse drawing techniques within our research of the Mongolian horse description, particularly, racehorse description specialty. After our study of different sources on the Mongolian horse descriptions we understood that foreign horse descriptions have prevailed in Mongolian Fine art. Therefore, we aimed to create the medium ratio image of Mongolian horses in the example of the moose-like racehorse image because Mongolian horse image has special features in comparison with horse images of other breeds in the world. Clarifying of medium ratio image of the Mongolian horses will be a significant contribution in the Mongolian fine art. Correct horse image is very important for Mongolian young artists who can show one of the unusual Mongolian culture parts in the example of the Mongolian horse images. Mongolians really love their horses that come back to its homeland wherever they were sold and that carried on their back Mongolians who established Mongolian Empire in the XIII century and brought to the world Pax Mongolica (Peace brought by Mongols). It is confirmed by the horse image on the national emblem of Mongolia. The possibilities to determine the medium ratio image of several shapes based on digital technology and references of Mongolian horse`s medium skeleton, muscles and appearance through the semiotic reference are considered in this article.

**Key words:** Racehorse, Moose-like Horse, Determining the Medium Image, Golden Ratio

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## 1. INTRODUCTION

In the process of modern technology and digital technique development we are considering our traditional art and design on the other side. The image of horses described by the ancient and talented people on the rock, bronze cast, wooden carving and unfolded paintings the characters of horses are shown with great skill. Moreover, there are many manuscripts on the determining the racehorse features and characters. The famous researcher Kh.Luvsanbaldan wrote in his book "Racehorse`s features", "Mongolians have used their best horses for hunting, war, private use, post-delivery and race during the festivals and holidays. Therefore, they left many manuscripts in which described good and bad features of horses, what horse is used for war, what horse can be ride in the uneven road, what horse can take part in the race of long distance and et cetera"[1].

Many researchers wrote about how people were connected with horses. The horse ancestors had rabbit-like body, the two front legs had four claws each and two back legs had three claws, named as hyracotherium, ate juicy grass and its height was 28-56 cm. As the result of evolution, the claws of ancestor horses were changed and became whole hoof that gave the horse to run fast and run away from predators.

There are over 250 horse breeds in the world now. The Mongolian horses formed 6000 years ago. Mongolian nomads have ridden horses, have tackled up them, have used their meat for food and have used their skin as mat for 4000 years beginning from the BC period. The horse races have organized for about 2000 years. In the picture "Building the monastery" the artist Besuden who lived in the VII century during the Kidan state period described the horse`s overall dimension exactly showing his knowledge of horse features.

Despite many works by Mongolian nomads about racehorses, we used the books "The secretes and the precisely hidden thing (Нууцын нууц, далдаас далдын шулуун журамт)", "Manuscript on the rare horse training (Эрдэнэт хүлгийн шинжлэх ба уях засах судар оршив)", "Features of the rare horse and easy way to tarin (Морин эрдэнийн шинж ба засах дээр хялбар таних арга)", "The brief feature of a horse (Морины шинжийн оршлын зүйл хураангуй төдий)", "Chapter named as sandy (Чихэр амт нэрт бүлэг)", "The feature of rare racehorse (Эрдэнийн хүлэг, хүлэг морины шинж)", Данжуурын 219-р ботид буй "Book on the horse age (Морины насны шастир)" in the book 219 of Danjuur for this article. The book "Racehorse feature wheel (Хурдан морийг шинжих хүлгийн шинжийн хүрдэн)" written by me in 2005 is also used.

In the center of the racehorse feature wheel the moose-like racehorse was described being included in the antelope type. We considered the moose-like horse, the biggest race horse among the horses with antelope type. Firstly, we used the method to determine the human face medium image for the correct shape of the race horse features. Secondly, the correct standing up of the race horse was described according to the horse anatomy. Over 100 photographs, center of which is focused on the racehorse`s scapular cartilage edge, were collected by us and the general basic average figure was determined on the basis of figure segmentation. The general basic figure`s points were determined on the spherical coordinate according to the metamorphose square technique using serial Fibonacci digital ratio. Fourteen changeable bone and muscle points that help to show the bone and muscle shapes were determined on the general basic figure.

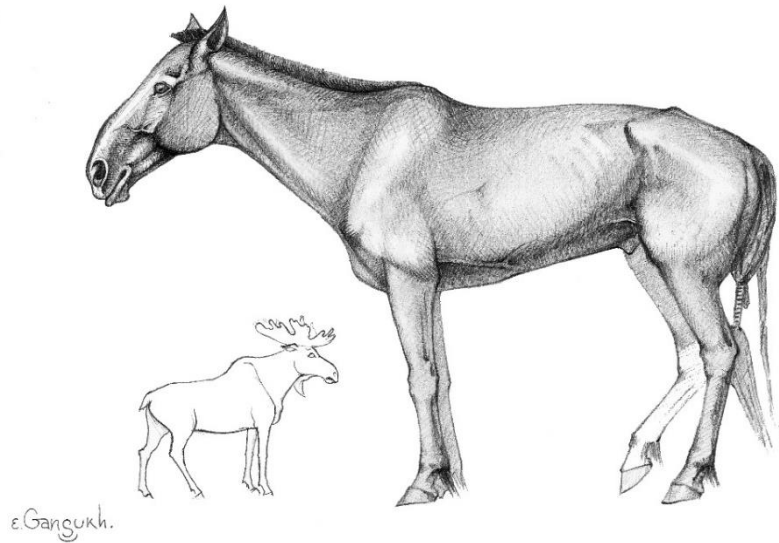
## **2. LITERATURE REVIEW**

### **2.1 RESEARCH DESIGN IN THE EXAMPLE OF THE MOOSE-LIKE RACEHORSE**

Nowadays, students and young artists in the Mongolian Fine art and Design field not often investigate the race horses` image features drawn by the publicly appreciated talented people. The race horses are drawn with poor motions and with many mistakes being copied from the photos without any definite features and only with color stressed. It means that the research in this field is rare. Moreover, the race horse features have not written in the works by people who study art. We determined that there are 108 features in a race horse as show our research work, the rare Mongolian sutras` contents, our nomadic ancestors life and oral histories by the race horse trainers. These features can be divided into 3, 6, 12, 24, 32, 64, 76, 108 parts connected with each other. Features that can be compared among many race horse features can be used for the Fine art and design.

Moreover, the golden ratio or Fibonacci retracement possibility of the studied horse shape was tried by us. The golden ratio overlapped on the formerly drawn horse image. Therefore, the available race horse images without any anatomy mistakes are included in the research field /Picture 6/.

Picture 1. The moose-like race horse



The features of the moose-like racehorse are considered by us in the following way:

**GENERAL FEATURES:** The moose-like racehorse is the biggest among the antelope-derived horses. It has long four legs, big firm head, long and hooked nose, big forehead, wide-stretched lips and nose and, thick first vertebra. Its body is short and it has wide ribs and thick back, big blades, thick limbs, all four legs are thicker that fit its corpus. Legs are put wider when it stands, its breast is higher than its buttocks and hollows behind its knees are big, in other words, moose-like horse is a stalwart race horse. As the moose-like race horse is strong and has long four legs it can run long distance without finishing off.

**FEATURE OF ITS HEAD, NECK AND CHEST:** The long nose that is good for long distance riding, big nostrils for deep breath and big forehead and wide eyebrow that show brave of the horse are typical for such race horse. Moreover, wide cheek bones thick ear base and head directed forward. Such head means that the horse`s the first neck and back side of the neck is thick. The race horse with the head directed forward holds its head lower that helps it to ride quickly in long distance and on the steep slope. And high crest of a horse, big blades show the horse`s strength. The convex sternum makes its front legs run freely. The moose-like race horse has the most perfect chest shape.

**ITS BACK, THORACIC VERTEBRAE, RIBS, BELL AND BUTTOCK:** The moose-like race horse has straight back and thoracic vertebrae and a little stoop, thick back and clear rib shapes that show the best horse shape. Its haunches have a little slope and its buttocks are far from each other and have square shape. The wide haunches fit its clear ribs

well. Wide haunches, clear ribs and far buttocks means that the horse has huge crotch. Huge crotch shows the horse's real strength and long, clear ribs show that the horse has a good stomach which keeps feed for long period during the race training.

**FEATURE OF ITS FOUR LIMBS:** Four limbs of the moose-like race horse are firm with all real muscles as the indication of its strength and all its joints are thick. These thick legs and straight back legs' hock of this big race horse increases its bottom's pushing strength. It is good if its thick leg tendons are thin and strong. The naturally horizontal pastern bones of the moose-like race horse are caused by its slim bones [2].

### **3. DETERMINATION OF THE MOOSE-LIKE RACEHORSE MEDIUM RATIO**

We used the technique of human face medium ratio determination for the determination of the moose-like race horse medium ratio. Firstly, in the 19 century Francis Galton, the famous British scientist and who is one of the first face analysisist tried to determine the image of a criminal but he failed. He overlapped the photographs of a criminal. Chinese researchers Syaolin Wu and Si Jan from a Chinese university made research to differ photo of a criminal from the normal citizen and they confirmed that "Lips bend, eyes lower corner and nose and mouth angles" can determine the criminal. "Shapes on the face are used for determination of the medium ratio of a criminal and a typical citizen" as they think.

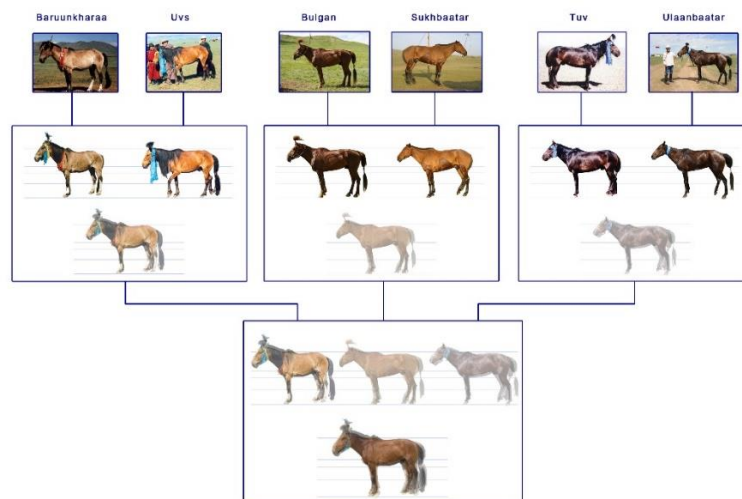
Over 1000 photos of stallions, four- and five-years old horses that took part in the state and region scale races in last 100 years were analyzed. All photos in the books "The secret of the race trainer", "The Quick Race horses remembered in the History", "Brief history of the quickest horses", "A century State Naadam Race Horse Chronicles", own collection of race horse trainers and horse race fans and their advices led to the correct choice of 1000 photos.

The feature of the typical race horse is determined by the measures of the best Mongolian horse. The ideal race horse image box (distances between limbs that forms box shape) begins in the highest point of the sternum, continues to the highest point of a shoulder and ends to the highest point of the buttock. After that this measure must match with the shape that begins in the highest point of the horse's fin, continues down the front leg and ends at the upper joint of the pastern. Exact matching of these two shapes means the horse is the best race horse with matched box. Moreover, according to the correct skull box requirement of the race horse it must have wide forehead and wide cheeks. The correct chest box

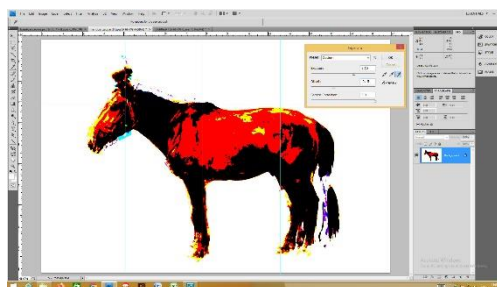
includes wither located backward of the typical horse wither and foreword directed shoulder. The buttock`s correct box consists of wide hip joint parts, even point of hip and square shape if you see it behind it.

Using the Adobe Photoshop digital program, we separated the photo of six horses that took the first and second places in the state and regional horse races from its background. After that, lines that go through the horse wither, point of its blades, sternum, knee and hoof edge were made. Firstly, figures of creamy stallion from Baruukharaa and yellow chestnut horse from Uvs aimag were overlapped to get the experiment picture 1. Then, the figures of brown stallion from Bulgan aimag and chestnut horse from Sukhbaatar aimag were overlapped for the experiment picture 2. At the end, the figures of the chestnut stallion from Tuv aimag and chestnut stallion from Ulaanbaatar city were overlapped for the experiment picture 3 /Picture 1/.

Picture 2.



Picture 3.

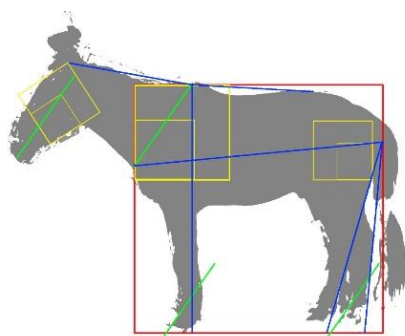


Then the experiment pictures 1, 2 and 3 were overlapped choosing the image+adjustments+exposure and using “gamma correction 0.01, exposure 2.15, offset - 0.15” and as the result light tones of the picture disappeared and overlapped dark image left determining the moose-like race horse body feature. Using the “layer style+color overlay” filled the image (Picture 2).

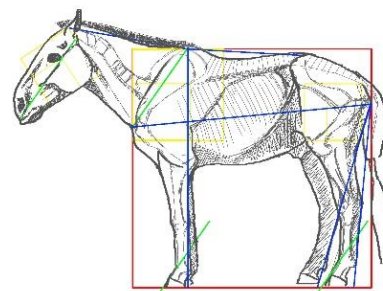
#### **4. ANALYSE OF THE MOOSE-LIKE RACE HORSE DESCRIBING**

When the moose-like race horse stands spaces between its legs are big, its chest is higher than its buttock, its splint is long and big and it is the tough race horse. It has short body, huge ribs and thick withers, big scapula, thick joints, thick and long limbs. It also has big head, long nose, hooking nose, huge forehead, wide-open lips and nose, thick mane and high crest as it was written in the manuscript. Despite measuring of the horse sculpture (in 3D) was possible, measuring of the plain picture was impossible. Therefore, we draw rectangle box that has line from the highest point of the sternum, continues to the highest point of a shoulder and ends to the highest point of the buttock and line from the crest to the end of the hoof. The line from the crest to the shoulder`s high point and the line from the crest to the concavity of the back forms the second rectangle. The line from the shoulder`s high point to the base of its tail forms a rectangle. This rectangle overlaps with the line from the ear back part to the land and with the cheek and face bone proving Mongolian horse measurements.

The best race horse has same head length, blade length and distance from high point of the buttock to the anus. As we measured these three distances have 55° slopes. Also, its head and for ergots have 55° slopes as the blade slope //Picture 3/.



Picture 3.



Picture 4.

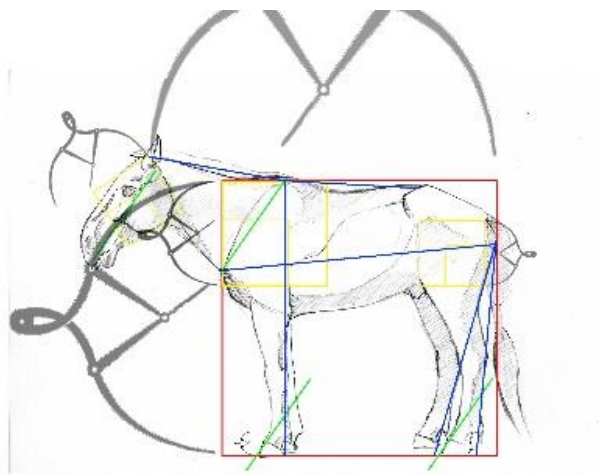


Firstly, the horse's figure is drawn on the correct box being overlapped. Its skeleton is described not so clear and its muscles are drawn. Describing the moose-like horse begins from its joints. The features of the moose-like horse are its large body, high and long crest, big blades and head, concave joint between neck and back bones, lower sternum, long ribs, thick for limbs, big and thick hooves, thick joint between head and neck, big nose down-turned lips and chins, wide and long buttock /Picture 4/.

## 5. CONCLUSION

Our goal to create the medium ratio image of Mongolian horses in the example of the moose-like racehorse that has special features in comparison with horse images of other breeds in the world is starting to be achieved.

The average image of the moose-like horse is determined after the overlapping of six images of the moose-like horses. The digital image of the horse was drawn on the Adobe Photoshop digital program on the basis of this average image using Wacom cintiq. The drawing is made beginning from the light tone and ending with the dark tone on the Adobe Photoshop digital program using window+tools+pencil tool. The master diameter lines of the brush are chosen being overlapped. The image formed as the result was checked by the golden ratio according to the digital sequence as 1, 2, 3, 5, 8, 13, 21, 34, 55 that is called as Fibonacci sequence. Greece Phi, the golden ratio is the mathematical constant. It can be expressed by the equation  $\frac{a}{b} \approx \frac{a+b}{a}$  1.618033987. If "a" is bigger than "b" it can be explained by Fibonacci God sequence.



Picture 5.

The Golden ratio has 1:1,618 dimension and there is divider that determines three points for the Golden ratio. Determining the height of the line from the end of a hoof to the with Golden ratio divider the central point of the divider overlaps with the point on the end of its shoulder. To determine the length of the investigating shape a line was made from the horse`s head relief to its hip`s muscle and the central point overlaps with its crest`s top. Moreover, head`s lines, blade`s lines, hip`s lines overlapped. Therefore, dimensions we made is near to 95%, in other words, it is close to the truth /Picture 5/.


A work for the students, artists and researchers who do art and graphic design contents about race horses will be ready if we finish our attempt to make 3D model of the moose-like race in ZBRUSH program and move in MAY program (walking, jogging, trotting, galloping and running) to show the attitude and color of the race horse.

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## AUTHOR'S INTRODUCTION

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