

# Interpretation of the Visual Order of Animal Figures in Paleolithic Cave Paintings in Europe

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**Abstract:** *The Paleolithic cave paintings in Europe during the Stone Age are the most convincing historical records of prehistoric human civilization. They represent the primary means of expression and the most valuable visual heritage of prehistoric human civilization. As the starting point of Western art, the interpretation of these cave paintings in the academic community has mainly focused on their functions and meanings. Representative theories include Taylor's "primitive magic", Fraser's "sympathetic magic", Kant, Schiller, and Spencer's "play", Engels and Plekhanov's "labor", Lu Xun's "on bison", and Wicke's "misplacement of emotions". However, if we shift our focus to the cave paintings themselves and explore the relationships and construction principles between different animal images, such as the presentation of high and low, top and bottom, far and near, connection and separation, and the temporal factors of before and after, we will discover the hidden constant principles or visual order within the Paleolithic cave paintings in Europe. This paper aims to interpret the visual order characteristics presented in the cave paintings through image analysis, while uncovering the inherent visual rules followed by humans in their initial attempts at using painting as a form of expression.*

**Keywords:** *Paleolithic; Cave paintings; Animal figures; Visual order; Interpretation*

Since the 19th century, with the further development of archaeological techniques such as stratigraphy, radiocarbon dating, thermoluminescence, and electron spin resonance, numerous sites from the Paleolithic era in Europe have been excavated. Archaeologists have proposed the concept of the "Paleolithic" period, which is roughly between 40,000 and 9,000 BCE and is characterized by the use of stone tools as a marker of human material civilization development <sup>[1]</sup>. Based on the geographical and temporal distribution of Paleolithic sites, archaeologists have divided the Paleolithic period into early, middle, and late stages. Prehistoric cave paintings in Europe primarily refer to the images painted on cave walls that appeared during the late Paleolithic period, approximately 30,000 to 10,000 years ago. The main creators of these cave paintings were Cro-Magnon people, who were Greeks of the Paleolithic era <sup>[2]</sup>. The geographical distribution of cave paintings is mainly concentrated in southern France, northern Spain, Italy, and various countries and islands in the eastern Mediterranean region <sup>[3]</sup>.

When we see these cave paintings from the European Paleolithic era, we feel a wild vitality, as if thousands of troops and horses are galloping right before our eyes. There is a tremendous sense of motion, transporting us back to the prehistoric hunting era. We see images of confronting wild bulls, swimming herds of deer, sprinting cheetahs, a majestic horse leading a herd in full gallop, wounded buffalo, pregnant mares, rhinos engaged in mutual combat, and spotted horses standing back to back. Although the creators of these paintings did not depict each animal in great detail, the animal images are easily recognizable and convey information about their actions and physique.

These images do indeed contain an inherent visual order. The creators of the cave paintings employed a simplified style to capture the essence of each animal and its movement. Through the use of simplified and essential forms, they were able to create a visual language that could be easily understood and convey a sense of rhythm and motion. This inherent visual order contributes to the powerful impact and dynamism of the cave paintings.

Arnheim pointed out that "vision, in fact, is the perception of the activity of the primitive material in front of us by creating a general formal structure that corresponds to the nature of the stimulus material. This general formal structure not only represents the individual things in front of us, but also represents an infinite number of other individual things that are similar to the individual things." [4] The "wild bull" in primitive caves may not be a specific, concrete wild bull, but instead a collective representation of the

visual perception of multiple wild bulls A, B, C, etc., and an image representation of the general formal structure of the wild bull species.

When discussing "order", people tend to see it as a product of human higher-level thinking, the result of the impact of Darwin's theory of evolution, or the outcome of John Locke's empiricism more than two hundred years before Darwin. However, the human visual system itself possesses complete perceptual abilities. Arnhem believes that "perceptual activity is a creative activity of the human mind. Even at the sensory level, perception can achieve what is called 'understanding' in the realm of rational thinking. Anyone's vision can, in a naive way, demonstrate that admirable ability possessed by artists, which is the ability to create patterns that effectively interpret experiences through organization." It is evident that the creation of patterns relies on the functioning of the visual perception activity itself.

### 1. Simplification of external form

The images in the cave rock paintings of the European Paleolithic period were rendered in two ways: line drawing and shading. Most of the works began with the engraving of the animal's outline, followed by the use of black mineral pigments or charcoal to draw the contours. Finally, pigments made from a mixture of colored mineral substances, charcoal, animal blood, soil, animal fat, etc., were used for shading or spraying. The most distinctive feature of the many animal figures in the European Paleolithic cave rock paintings is their simplification of external form, as seen in Figure 1, and so on.

In 1940, four boys from a village in the Dordogne region in southwestern France, accompanied by a dog named Robot, unintentionally discovered the Lascaux Cave in the Vézère Valley near the town of Montignac in the Dordogne department. The cave consists of a long, unevenly wide passage filled with approximately 1500 rock engravings and 600 paintings. The artworks feature various colors such as red, yellow, brown, and black, with the most spectacular section being an irregularly shaped chamber known as the Hall of Bulls.

On the cave floor, charcoal, pigments, and carving tools used for the artwork were also found. Radiocarbon dating of the carbonaceous materials suggests that most of the cave paintings were created around 15000 years ago, approximately in 15000 BCE <sup>[1]</sup>. The cave paintings of Lascaux are precious remnants of early human art and hold significant significance in understanding the culture and way of life of ancient humans.

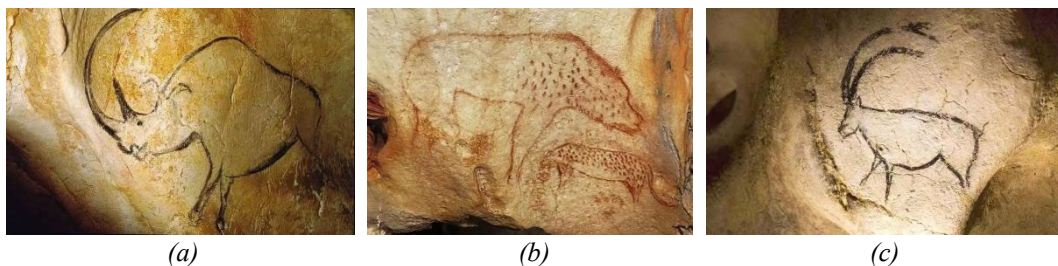


Figure 1: (a) Rhinoceros, Chauvet Cave, Vallon-Pont-d'Arc, France, Approximately 30,000 to 28,000 years ago or around 15,000 to 13,000 years ago. (b) Cheetah, Chauvet Cave, Vallon-Pont-d'Arc, France, Approximately 30,000 to 28,000 years ago or around 15,000 to 13,000 years ago. (c) Antelope, Chauvet Cave, Vallon-Pont-d'Arc, France, Approximately 30,000 to 28,000 years ago or around 15,000 to 13,000 years ago.

Among the numerous depictions of animals in the Lascaux Cave in France, one particularly noteworthy artwork is the painting of "The Great Bull" (Figure 2). In this painting, the bull's head is depicted in profile, while the horns are shown from the front. In reality, the skeletal structure of a bull would be covered in thick fur, and aside from the horns, the other facial features would not be prominent. The artist chose to omit the intricate details of the bull's body and its natural environment, instead using bold lines to present the structural form of the bull in an extremely simplified manner on the cave wall.

It is evident that the painter did not strictly adhere to a fixed viewpoint, which is consistent with our visual habits. If we strictly followed a profile view, we would only see one horn of the bull. However, doing so would result in an incomplete representation of this animal. In fact, the artist depicted a simplified version of the bull based on visual cognition: a bull with two horns, four hooves, a sturdy spine, and a drooping belly. Kurt Badt explained artistic simplification as a means of organizing artistic elements based on the insight into the essential nature, in which everything else is subordinate to that

essence. It is clear that the artist captured the core essence of depicting the bull's structural form. Please note that the given translation is a paraphrase of the provided text and may not capture the nuance and exact wording of the original.



Figure 2: *The Great Bull. Found on the left wall of the "Hall of the Bulls" in the Lascaux Cave, France. Created between 16,000-14,000 BCE. The largest bull depicted measures 350.5 cm.*

During the Paleolithic era in Europe, the creators of cave paintings extracted the complex morphological features of animals from the chaotic natural world and condensed them into simplified and visually complete forms. This style of simplification in artistic representation aligns with the mechanisms of human visual perception. "Under certain conditions, visual perception tends to organize any stimulus pattern into the simplest possible structure" [4].

The cave paintings of the European Paleolithic era were created by artists based on their visual experiences, such as hunting activities, which they recalled and depicted. According to the principles of visual perception, the weaker the stimulus power, the stronger the tendency for perception to simplify and generate. When the real stimulus of hunting animals disappeared, the traces in memory also became faint.

Recreating the memory of hunting animals using rough and concise lines allows for a reaffirmation of their external features, enabling better discernment and memory of their forms. When exploring the relationship between visual perception and image reproduction, Gombrich emphasizes the vital role of "memory" and "recognition". He believes that 'we enjoy looking at representations of things because we are simultaneously observing and learning, deducing what each part represents, such as, this is a certain object.' In other words, it is a pleasurable act of recognition. "Naturalistic paintings allow us to recognize our familiar world from the arrangement of pigments on the canvas."<sup>[4]</sup>

Simplified and accurately depicted animal forms help the primitive people who primarily relied on gathering and hunting as their means of production to quickly recognize the physical characteristics of animals and reinforce their memory of animal forms, aligning with their survival needs. Moreover, Gestalt psychology suggests that every psychological activity of humans tends towards a simple, balanced, and organized state. Hence, animal images in the European Paleolithic cave paintings commonly exhibit simplified external forms.

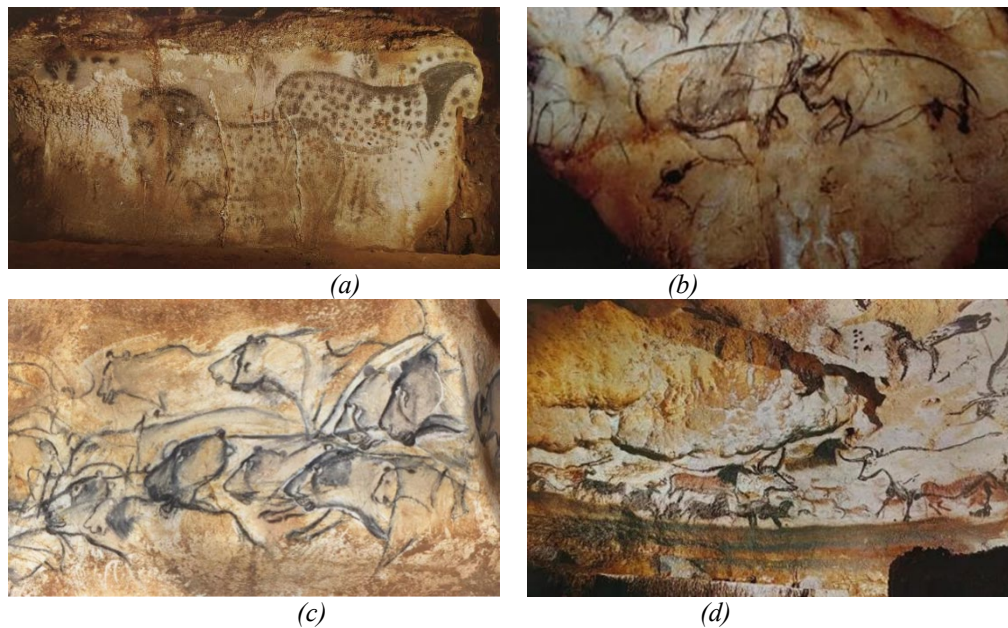
## 2. The directionality of composition layout

Looking at these cave paintings, in addition to the simplified external form, visual order is also reflected in the directionality of composition layout, particularly in the facing relationship of the animal images. This clear visual direction guides the viewer's attention towards the animal forms and their structural and movement patterns.

Upon careful analysis, we can observe that these cave paintings depict various ordered relationships in terms of height and low, up and down, far and near, connection and separation, as well as chronological order of before and after. Some of these animal images exhibit distinct directional relationships, such as facing towards, facing away, group orientation to the left, and group orientation to the right.

For example, in 1922, a group of teenagers discovered the Pech Merle cave in the Lot department of the Occitanie region in southwestern France, where many of the cave paintings were completed 25,000 years ago. [1] Among them, a group of "spotted" horse paintings (Figure 3 (a)) clearly depicts a directional relationship. The two horses have their heads facing in opposite directions, their bodies are staggered in height, and their tails overlap with each other. Even if the horse in the background is partially hidden by the one in front, viewers can still mentally complete the missing part of the horse in the back based on the

complete morphological information of the one in the front. The back-to-back arrangement of the horses with one facing left and the other facing right, and one in front of the other, creates a strong sense of visual order for the viewer.



*Figure 3: (a) A horse with spotted markings and "negative" handprints, French Pech-Merle cave paintings, approximately 23,000-22,000 years ago, measuring 340.4 centimeters long. (b) bison, horses, and a rhinoceros in the Chauvet Cave rock paintings in Vallon-Pont-d'Arc, France. These paintings were created approximately between 30,000-28,000 years ago or around 15,000-13,000 years ago. The rhinoceros on the right side measures 101.6 centimeters in length. (c) a cheetah in the Chauvet Cave rock paintings in Vallon-Pont-d'Arc, France. These paintings were created approximately between 30,000-28,000 years ago or around 15,000-13,000 years ago. (d) group of bison on the left wall of the "Hall of Bulls" in the Lascaux Cave, France. The rock painting dates back approximately between 16,000 and 14,000 B.C. The largest bison in the painting measures 350.5 centimeters in length.*

In Vallon-Pont-d'Arc, located in the Ardèche department in southeastern France, the Chauvet Cave was discovered in December 1994. The cave is 25 meters deep underground, approximately 500 meters long, with an area of 8,000 square meters, and contains over 1,000 rock paintings. The paintings in the cave were created approximately between 30,000 and 28,000 years ago. [1] There are two distinct groups of paintings in the cave that exhibit clear directionality.

One group portrays rhinoceroses engaged in a head-on attack (Figure 3(b)). The two rhinoceroses' horns are stacked together, their bodies positioned at different heights. The strong and compact lines convey the sense of the rhinoceroses exerting their full force, with their hind hooves tightly gripping the ground.

The other group depicts a herd of cheetahs facing left (Figure 3(c)). The heads of the cheetahs are all turned towards the left, suggesting rapid movement in that direction. The cheetahs in the composition are depicted in a layered manner, with those closer to the visual center being the largest and clearest. As the distance from the visual center increases, the representation of the cheetahs becomes more simplified.

The rock painting of a group of bison on the left wall of the "Hall of Bulls" in the Lascaux Cave in France (Figure 3(d)) exhibits a directional relationship. It portrays two groups of bison standing face to face with a certain distance between them. The horns of the two bison in the front are curved forward, indicating a potential confrontation.

In his book "The Sense of Order", Gombrich pointed out that "the orderly frame of reference within the organism is sufficient to enable the animal to pursue and avoid, to react to every kind of stimulus. Logically, the animal has the internal frame of reference before it reacts to any stimulus."<sup>[5]</sup> When animals process and react to stimuli based on visual perception, they establish a sense of spatial orientation according to the orderly frame of reference within themselves. This suggests that even animals in primitive times possessed a sense of direction for spatial orientation in biological terms. The creators of the European cave rock paintings in the Paleolithic era depicted the relationships among



different animals, such as up and down, front and back, left and right, overlap and occlusion, and facing and turning away, as well as the relationships among the formal elements that constitute the animals themselves, in a regularized manner based on the behavior of these animals in real life. Based on their deep understanding and research of the animals that survived in the Paleolithic era, the creators organized the animal images on the rock walls in a regularized and orderly way, linking and interacting with each other and creating a strong rhythm and melody. As a result, the animal images in the European cave rock paintings in the Paleolithic era exhibit a distinct sense of direction in terms of their spatial hierarchy and arrangement.

### 3. The sense of balance in visual intensity

Visual balance is a state of equilibrium and one of the signs of stability and order. It refers to a visual sense of balance with the visual center as the fulcrum. Gombrich once said, "One of the most basic expressions of our sense of order is a sense of balance. Balance lets us know what is up and what is down according to the effects of gravitation and what we see around us."<sup>[6]</sup>In the European cave rock paintings of the Paleolithic era, animal images exhibit a sense of visual balance in two aspects. The first is the balance of gravity distribution of the animal images in the painting, and the second is the balance of the chromatic relationship of the animal images in the painting.

Here, gravity refers to the visual perception of "gravity." Gravity is an important force that affects the balance of the composition. All objects are subject to the force of gravity, including our visual perception of objects, which is influenced by our experiences with gravity.

Due to gravity, there is an inherent asymmetry between the top and bottom parts of a composition. Gravity is a downward force, and in a composition, the bottom provides support and gravity accumulates there, resulting in a stronger sense of gravity at the bottom, making it appear heavier. The asymmetry caused by gravity is always present, and if it is too pronounced, the composition may give a sense of falling or imbalance. Therefore, other perceptual forces need to be coordinated with gravity in the composition.<sup>[7]</sup>

There are generally multiple aspects of composition arrangements to achieve this. Firstly, raising the center of gravity of the composition; secondly, providing stable support at the bottom of the composition; and thirdly, strengthening the connection between the top and bottom of the composition. In the cave rock paintings of the Paleolithic era, the creators utilized downward gravity to mitigate the imbalance between the larger body of an animal and the smaller limbs, thus achieving visual balance in the animal images.

The distribution, size, depth, and warmth/coolness relationships of colors in a composition also influence visual balance. The larger the area a color occupies in a composition, the heavier it appears visually. A composition with darker color tones appears heavier compared to one with lighter color tones. Warm colors generally appear heavier than cool colors. In the cave rock paintings of the Paleolithic era in Europe, the animal images were rendered with a high level of realism in color, showcasing a sense of visual balance in the color arrangement of the composition.

For example, the Altamira Cave in Santander Province, Cantabria Autonomous Community, northern Spain, was discovered by the archaeologist Don Marcelino Sanz de Sautuola (1831-1888) and his daughter Maria in 1879. The cave is about 270 meters long, with a height of 2 to 3 meters and varying widths throughout. Over 150 cave paintings are concentrated on the ceiling of the entrance, measuring 18 meters long and 9 meters wide. These paintings are ancient works of art that date back to the Upper Paleolithic period from 30,000 to 10,000 BC.<sup>[1]</sup>

One of the cave paintings on the ceiling is The Great Black Bull (Figure 4), which depicts a side view of a large bull. The bull is 158.8 cm long and 120.3 cm high, with graceful and flowing lines depicting the huge form of the animal. In the painting, the creator drew the limbs of the animal in a thinner and smaller form, located beneath the body. The body, which is located above the limbs, is depicted as very plump and occupies a larger area. The creator utilized the visual law of gravity to balance the limbs and the body, which produce a stable feeling of the bull in the visual sense.

In addition, the creator also balanced the visual effects of the colors used in the painting of the bull, whose body is mainly brown with some black detail. Black appears visually heavier than brown, and the painter used large areas of black hues on the belly and limbs of the bull, making the body appear weighted towards the ground. He used only a small amount of black hues on the head and upper spine to achieve a balance between the heavier lower body and the lighter upper body. By balancing the

distribution, size, depth, and gravity effects of the colors, the creator achieved visual color balance in the painting of the bull.



Figure 4: The Standing Bull in the ceiling of the Altamira Cave in northern Spain. It is a partial view of a cave painting dating back to approximately 13,000-11,000 BC. The Standing Bull measures 158.8 cm in length.

#### 4. Conclusions

In summary, by analyzing the characteristics of animal images in European cave paintings from the Paleolithic era, such as the simplification of external forms, directional composition, and balance of picture strength, it has been confirmed that these cave paintings are not simple graffiti behaviors of the original creators, but rather expressions of their experience and emotional cognition based on visual perceptual activities. The relationship between visual perceptual activities and visual order is actually the relationship between the intrinsic functions and transformations of visual organs. Human visual perception involves the establishment of visual order in the process of abstracting, analyzing, synthesizing, supplementing, correcting, comparing, combining stimuli, separating and highlighting objects in the background.

#### References

- [1] Ed. Fred S. Kleiner. (2010) *Gardner's Art through the Ages*, 13th edition. Cambridge, MA: Wadsworth Publishing.
- [2] Zhang Y S, Zhang X X. (2023). *Theory and method of rock painting research: A case study of cave rock painting in the late Paleolithic Age*. *Journal of Northwestern University. Philosophy and Social Sciences Edition*. 53 (1), 132.
- [3] Ofer Bar-Yosef. (2016) *The Last Glacial Revolution*. *Nanguang Cultural Relics*, (1), 247-248.
- [4] Rudolf Arnheim. (2004). *Art and Visual Perception, a psychology of the creative eye*. Berkeley: University of California Press.
- [5] E. H. Gombrich. (1994). *The Image and the Eye: Further Studies in the Psychology of Pictorial Representation*. Brooklyn, NY: Phaidon Press.
- [6] E. H. Gombrich. (1994). *Sense of Order: A Study in the Psychology of Decorative Art (The Wrightsman Lectures, V. 9)*. Brooklyn, NY: Phaidon Press.
- [7] Liu Yue. (2020). *Analysis of the Formal Language of Painting*. Tianjin: Tianjin Fine Arts Publishing House.