

Geometry of Native American Art

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The Native American culture is one of the most overlooked in the world. They were the first civilizations in North America, but do they get the same recognition as the Egyptians, Chinese, or even the Europeans? Everyone learns around high school of the Renaissance Period in Europe and about the great artists of that time, but where in the history books can you find information about the great Native American artists? The answer is nowhere. Matter of fact, there is not much, if any, knowledge of the names of any artists in North America before the Europeans arrived. Now, by no means could one assume that Native American art gets thrown to the side. Just go online and find an art gallery of American Indian art, or better yet, go to Arizona, New Mexico, or Oklahoma and walk down a sidewalk full of street vendors. Take a close look at the price tags, and it will not take long to see that some people must appreciate this style. It has only been in the past century or so that Americans have rushed to get their hands on authentic pieces of Native American art. So, with this little known about the past of a culture the next logical step would be to bring in mathematics, right? Well, actually, there are some very interesting geometrical themes imbedded in this art culture. Most people first think of war paint or teepees when asked about American Indian art and not angles and numbers, but, in fact, most every weaved basket design one sees comes from the original settlers.

Now what are these geometrical patterns? They could be anything from specific patterns or total randomness. Some simple geometric designs that are seen everyday are on the dollar bill, a keychain full of keys, just about every board game setup, and many more. So once a pattern is noticed the next step is to see if it happens anywhere else. For example, if the seals on the reverse side of the American dollar bill follow certain

geometrical shapes, then one may ask if other nations' currency follow a similar pattern. If so, then the next question is why? Most everything in today's world has evolved into what it is due to a culmination of ideas, cultures, and time. So the fact that the bald eagle is positioned in an invisible pentagon may have come from a British emblem, family crest, or possibly could have been an original idea. Just as it is now, art was found in everything that the Native Americans used. They put designs on clothes, baskets, pots, forks and spoons, jewelry, tools, weapons, boxes, and much more. Where did the ideas come from? Well, by separating the American Indians into regions, one can look for similarities and differences between the different regions and within the region. This paper deals with art before the 20th Century, since travel was not as easy as jumping in a car a driving a few hours to a different region.

Southwest

The American Southwest was settled by four main cultural subdivisions in the prehistoric era. They were the Mogollon, Patayan, Hohokam, and Anasazi. The Mogollon settled in the present-day New Mexico and the southeastern region of Arizona. Most of the patterns in their artwork come from the Anasazi influence. The Apache tribe spawned from the Mogollon people. The Hohokam Natives were greatly influenced in their culture from Mexico, due to their location in central and south Arizona. The tribes Pima, Yuma, Papago, and some Apache tribes are linked to the Hohokam past. The Patayan were the most western located of the four subdivisions. They were excellent potters and linked the Southwestern Natives with the California tribes. Due to their many contributions to all aspects of Native American culture, the Anasazi will be covered in a separate section. The most common of all Native American art that is seen today is from

the southwest. While most artwork that is seen is more contemporary, there is still plenty of older work still preserved from these tribes. Some of the main contributors to in this area include the Navajo, Zuni, and Santa Ana tribes. We shall, again, look for comparisons between the geometry of these tribes along with other smaller tribes of the area.

Anasazi History

The Anasazi Indians were the ancestors to the Hopi, Zuni, and Pueblo tribes of the American Southwest. They existed around two thousand years ago and were located close to the present-day four corners region. They eventually settled in three different centered areas, which were Chaco Canyon, Mesa Verde, and Kayenta. They were very independent from other tribes in the same area. They did not become involved in wars or disputes between other tribes that did not concern them. This allowed them to survive much longer than other tribes. They used their own language, which ostracized them even more. Here, the Hopi, Zuni, and Pueblo tribes will be studied in the similarities and differences not only to other tribes but also within their ancestral linkage. The Anasazi and their descendents were skilled at pottery, and most of the art that is around today is carved or painted on the pots.

Anasazi Geometry

The Anasazi people were very traditional in their designs on pottery. They mostly kept to a few simple patterns and intermixed them to create very interesting geometrical designs. Spirals were used very abundantly.



Figure 1

One can notice that the spirals can be either circular or sometimes in a square pattern (Figure 1 and 2). The checkerboard in Figure 3 is interesting as well. This should be

compared to Figure 4. The simple checkerboard pattern can represent the symmetry of static and

active. In Figure 5, one can see a multitude of geometric patterns. The artist has used the step pattern, cross-hatching close to the rim, and a slightly skewed symmetry. A similar Anasazi bowl is Figure



Figure 2

6. In this case one can see steps and circular spirals all rotating around the center solid circle (possibly the sun). In contrast to the previous bowl, here the artist uses more detail in the background, which adds energy to the design. Figure 7 shows the spiral approaching a center point with a rotating design. The Anasazi also commonly used an s-curve. This is very similar to the spirals and the majority of the time they used interlocking s-curves as shown in Figure 8.

Since the Zuni tribe followed from the Anasazi it should be interesting to see if they followed the same designs as the Anasazi. Well, in fact, it can be seen that they did



Figure 3



Figure 4



Figure 5

in fact keep with many of the patterns passed down to them. Zuni pottery tends to have more step patterns. To them it represents the “rain people” coming down to earth. They often used a continuous pattern of steps, which may show that the Zuni people understood that this is a never-ending occurrence.



Figure 6

Geometry in the Other Southwestern Subdivisions' Art

The resemblance between the Mogollon and Hohokam art and that of the Anasazi is undeniable. The striking similarities between the patterns and prevalent geometrical structures give no doubt that the Anasazi in fact influenced them. In Figure 9 one can notice the step pattern in both the bowl and pot. Also, the reader should note that there is somewhat of a spiral that ends with a semicircle. This semicircle is not a shape commonly used by the Anasazi. In Figure 10 the spiral is exemplified even more, along with the squared spiral that was seen in some of the previous Anasazi artifacts. Figure 11



Figure 7



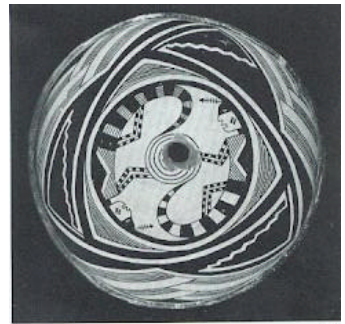
Figure 8



Figure 9



Figure 10



28



Figure 11

shows two examples of the rotation pattern and the stepped design can be seen along the leg of the birds.

Navajo History

The Navajo Indians arrived in the present-day four-corners area of the United States around 6 to 7 centuries ago. At the time they were called the Taa dine' tribe, and they learned to live in peace with the existing Anasazi tribe that were already in the area. They were a nomadic tribe that learned to live comfortably in the tough climate of the American Southwest, which has brought some to call them the "Lord of the Desert." The Navajo produced many forms of art. They were great potters and painters, but they are most respected for their weavings. The Navajos learned weaving from neighboring Pueblo Indians and it is here where one can learn their religion and legends.

Geometry of Navajo Art

The geometry that the Navajo Indians used was simple, yet states a direct purpose in the patterns. The most common occurring geometrical shape is the diamond (or rhombus). Some other common shapes that were used are the rectangle and triangle.



Figure 12

A Navajo artist would often use the shapes along with zigzag or parallel lines to complete the pattern. In Figure 12 one can see how the artist combined the solid center with the rectangles and diamonds on the edge to represent the Navajo's cultural emphasis on restrained aggressiveness and controlled movement. It is important to this tribe to maintain a balance between static and active. This can be seen again in the next few

blankets (Figure 13 and 14).

Another significant feature of Navajo

art is the use of number symbolism.

The number four, from the four

directions, represents completeness,

where as the number three is

associated with incompleteness. In



Figure 13



Figure 14

other examples one can also notice how the three active stripes all

have incomplete patterns in following with this idea. A good

example of this is in Figure 15 where one can see the four stripes

of arrows and inside each stripe the weaver has placed three sets of

opposite pointing arrows. A closer look reveals an incomplete

fourth arrow on each edge of the rug. The arrows indicate

movement and activity, and the artist is showing that one wants to

stay balanced in his actions and balanced between static and active.

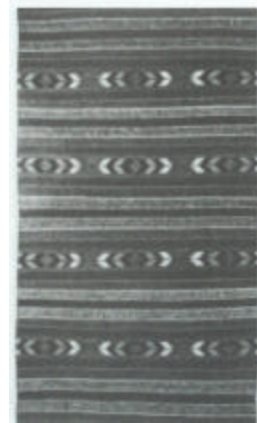


Figure 15

Southeastern

More than 3000 years ago, the hunting and gathering population of the southeast

started to grow wild plants and farm. This change that took place for centuries changed

how these people lived and the culture as a whole. The rise of agriculture allowed these

people to trade with surrounding tribes for other necessities such as baskets, tools,

clothes, and jewelry. The leaders of the tribes would try to obtain as much riches as

possible. A leader would be “wealthy” due to his accumulation and distribution of

various things. An appreciation for art for its own sake is seen in the period. Many of

these “wealthy” individuals so cared for their art that they were buried with it in their tombs.

More recently, in the 16th Century, European explorers came through the Native American territories and basically wiped out the Native populations. This was done, sometimes unknowingly, by bringing diseases to the Natives. Due to this, the remaining Natives formed small villages and tribes such as Cherokee, Creeks, Choctaw, and Chickasaw. Florida was virtually depopulated by 1710, so bands of Creek Indians moved there and became recognized as Seminoles. But, the fate of the Southeastern Indians was not finished. The expansion of the United States threatened to completely annihilate the whole culture of all the Native American tribes, so some tribes decided to fight back. In fact, large numbers of Creeks and Seminoles started a guerrilla war that lasted for a brief period until 1858. In 1830, the United States Congress passed the Indian Removal Act and forced all Indian people to present-day Oklahoma. This “Trail of Tears” led to approximately one-third of the Natives dying on the journey.

Geometry of Southeastern Art

Like most others, the southeastern Natives thought of the spider as one of the most mysterious and treasured creatures, and it was represented in many of their artwork. In Figure 16, found in the present day Mississippi area, the spider is inscribed in three circles. The double circle on the back of the spider adds to the symmetry seen on this piece.



Figure 16

The placement of the legs is very interesting. Why did the artist decide to position them

in pairs? A likely answer could be that since the four cardinal directions, represented here by the cross in the center, divide the space into quadrants, and the artist felt this would provide for better symmetry.

The Natives of the southeast also were quite fond of using the spiral. Their spiral differed from the southwest spirals in that they were more tightly wound. Also, the spirals seen in this region were different because the artists sometimes used more than one line spiraling in on itself. Figure 17, also from the Mississippi region, shows how the spirals are more like the design left by a comb spiraling in sand. Figure 18, found near the previous one, has a similar design but the wider spaces left between the lines gives the design a more relaxed flow than that of the very active Figure 17. An even more relaxed spiral is seen in Figure 19. This is very similar to the yin-yang of China. In fact, many different yin-yang-like designs have been found in many different regions of North America. It is believed that these were created without the influence of other cultures.



Figure 17



Figure 18



Figure 19

Plains

Since most of the Native Americans in the Plains region were hunters and gatherers, they relied on the hunt to provide everything that they needed for survival. They found use for all parts of the animals that they hunted. The hunters felt that they must have a private spiritual interaction with the spirits of the animals so that they might be successful. This was done in dreams and provided them with images that they would paint or carve out. Since they were nomadic, most of the art needed to be easily moved from one place to another, although in some cases they would go as far as arranging many stones in large areas to express their dreams.

Women of the Plain region were able to express their art in clothing or containers. They mostly kept with decorative designs and patterns that were handed down from their mothers. They held exclusive rights to these patterns, so eventually art could be easily identified to a specific tribe.

Around 900 CE some permanent villages became established and inter-tribal trade and cultural exchange was spreading. The nomadic tribes were the ancestors of the Plains Apache, Cheyenne, Kiowa, Arapaho, and Blackfeet. The farmers were the ancestors of the Wichita, Pawnee, Arikara, and others along the Missouri River. The arrival of the Europeans caused a complete change of life with new tools and weapons being a necessity, the Native people needed to trade items in order to get them. Art was lifted to another level with more cloth and beads available. This period saw the more stereotypical Indian garments of long headdresses and colorful saddles. Eventually, the expansion of the United States took its toll on the Plains Indians and through war or treaties they were forced to reservations.

Geometry of the Plains Art

The Arapaho jewelry shown in Figure 20 is very representative of the design that they often used. The circle stands for the sun and has the four directions protruding from its center. The marks between each direction add to the symmetry. One should note that each flap has three repeated designs, and each design has a

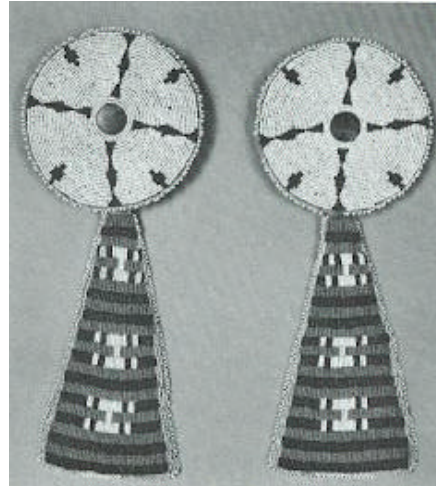


Figure 20

numerical theme of four. This possibly could have the same meaning as that of the Navajo in the southwest. The shield shown in Figure 21 features the Thunderbird surrounded by smaller birds, which stand for powers of swiftness and agility. The seven circles are the seven stars of the Pleiades with the crescent moon above everything.

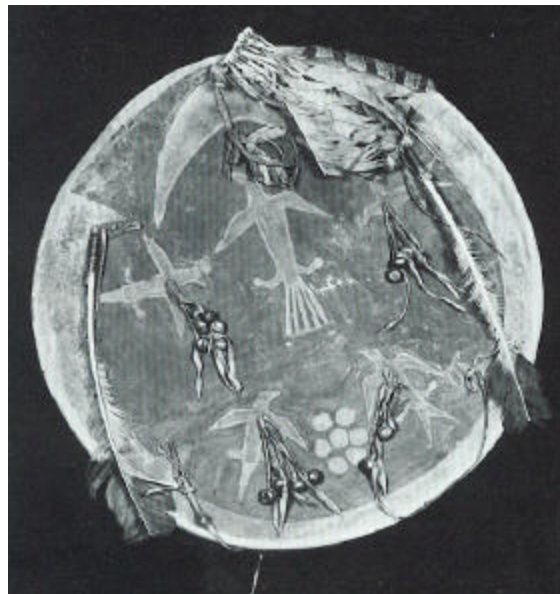


Figure 21

All of these were very significant numbers to the Cheyenne. There is an interesting story that involves this shield. It was the shield of Little Rock, a very high-ranking Cheyenne warrior, until after his death at the Battle of Washita in 1868 General Custer obtained it. After defeating the Cheyenne he gave the shield to the president of the United States as a gift. He told the president that it was a great gain because the loss of the shield is a disgrace to its owner. Next, the leggings of a Cheyenne (Figure 22) also

had geometrical designs. Again, one notices the reoccurring numbers three and four. On the bottom portion of the leggings there are several instances of groups of four. They are the stripes, triangles, and upon closer examination, there is one mark in each triangle.

California

The Native Americans in California are distinct for two main reasons. First, before others arrived, they lived an easy life compared to most other areas and did not need agriculture.

Secondly, they had to endure the most brutal treatment from invaders. California was home to the densest population of all Native Americans. There were many small tribes that spoke three hundred different dialects. The climate was generally good and the land was so productive that nuts, fruits, and seeds could be harvested without agriculture. California Indians did not have pottery, textile weaving, metalwork, and did little carving, but these Natives are known to have the best basketry in the world. This is, by far, their greatest art, and even today their baskets can sell for thousands of dollars. Unfortunately, foreigners came and brought with them diseases and war. From 1769 to 1972 the California Indians had to endure the Spanish Missions, the Mexican haciendas, the American 49ers and the vigilante “Indian Killers.” They were left landless and in poverty, and even had to fight the Bureau of Indian Affairs for any improved conditions.

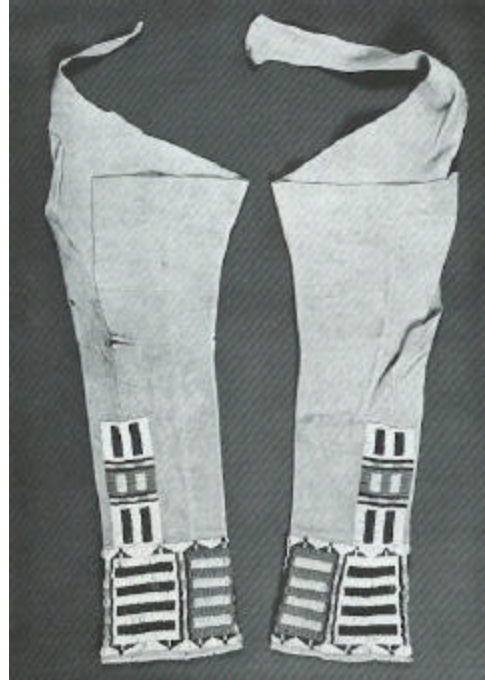


Figure 22

Geometry of California Art

Since basket making requires weaving at angles, it allows for many good geometrical designs. So it comes to no surprise that the Native Americans from California have some of the most interesting and beautiful patterns. Even though there may have been some language barriers, there is little to no doubt that most all of the neighboring tribes in California shared their design ideas. First, in Figure 23 we have a basket from the Hupa tribe. This is a very plain and simple design of zigzagging steps, something that is common to almost all of the baskets in



Figure 23



Figure 24

this region. This can be compared to Figure 24 that has a very similar design, but also adds an extra element of symmetry. This produces a more lively design and almost makes the design jump off the basket. It is also important to note that each basket has three steps up and down. Figure 25 exemplifies the step pattern as well, but instead of a continual path around the basket, here the path is from bottom to top. In some cases, tribes will repeatedly use a geometrical shape to represent something. In Figure 26, the



Figure 25



Figure 26

triangles stand for fire or heat. This is a basket that would hold a blanket. The hexagon pattern is interesting in its own right, and is not seen very often.

Summary

So, where did these patterns come from? The best answer would be to say that all of the regions influenced each other in some way or the other. Of course, the Europeans did have their influence on the Native Americans, as well. When they arrived, they brought all kinds of new materials that improved and changed the way that the Natives expressed their artwork. But a few patterns seem to have stayed constant throughout time. These are the stepped design and zigzag pattern. Even to this day these are major similarities between all the artwork of every region.