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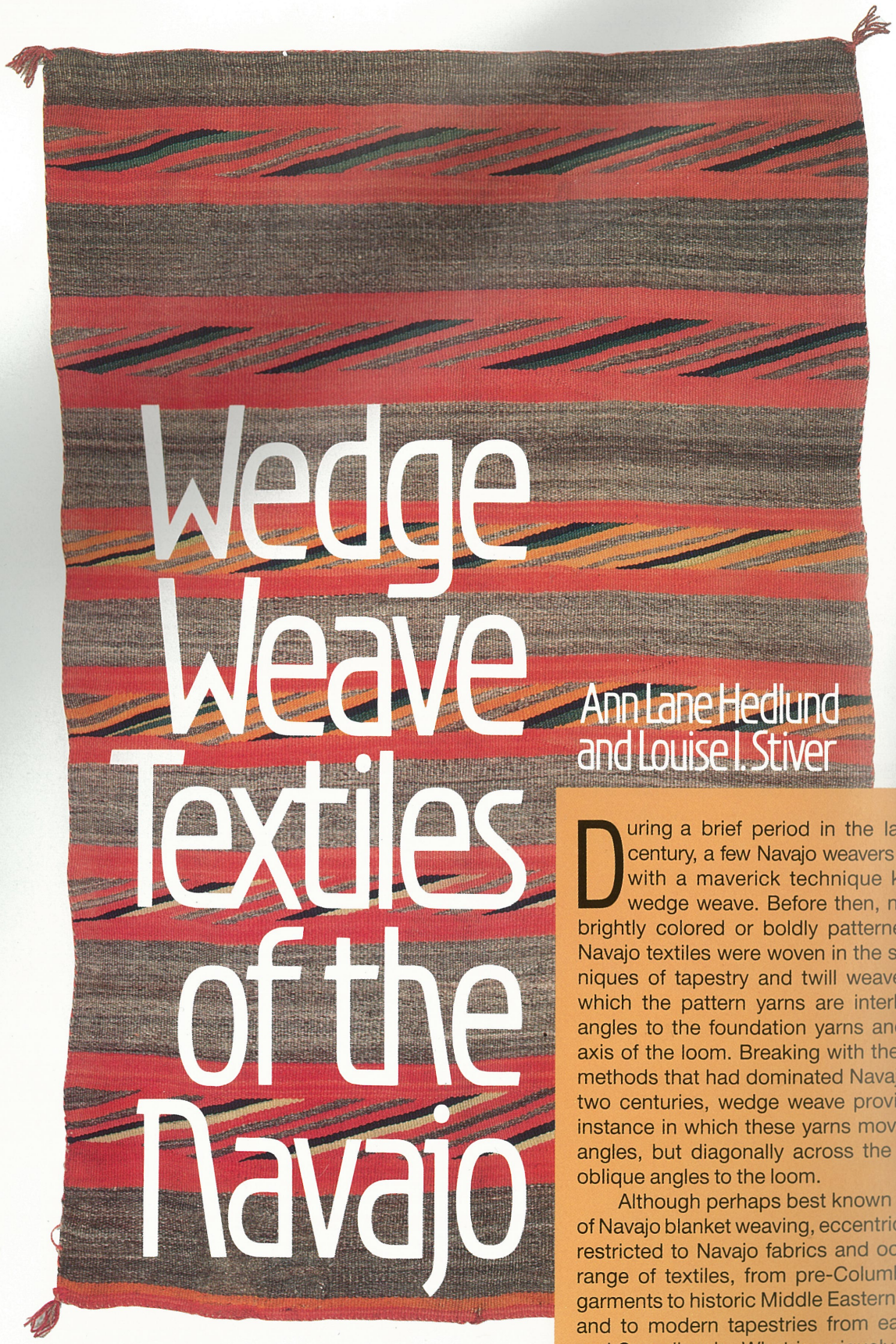
*Cover: Pitcher, Anasazi, Tularosa Black-on-White, c.1150-1300. Zoomorphic handle, decorations of interlocking half-terraces, stepped hatching, triangles and circles. 6-1/4" high, 6-3/8" diameter (16.1cm x 16.5cm). Gifted to the museum by Mr. and Mrs. Jacob Barth in 1974. Courtesy Museum of Northern Arizona, Flagstaff. Cat. No. 6183. Photograph by Chuck Place. (See pages 46-53.)*



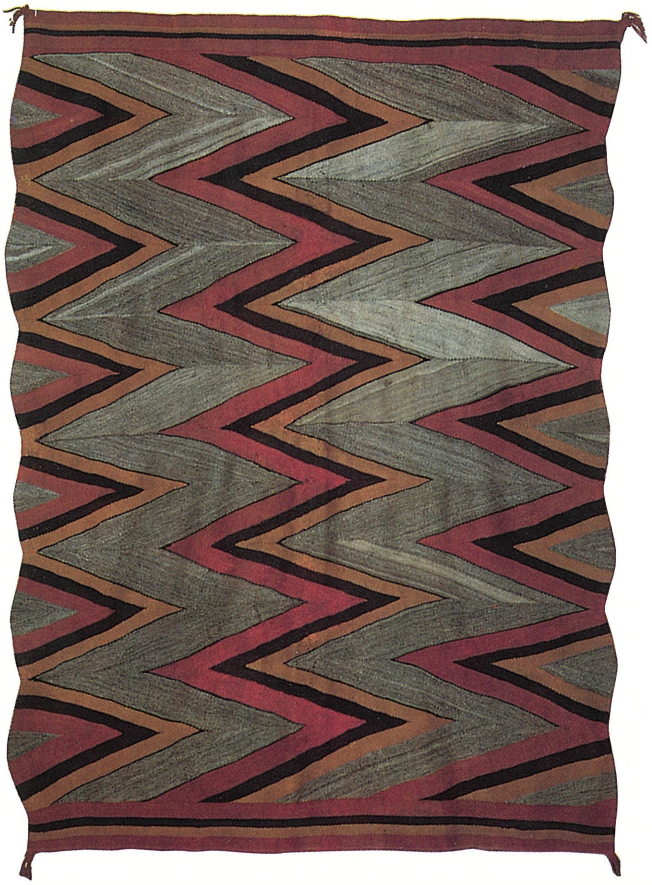
# Wedge Weave Textiles of the Navajo

Ann Lane Hedlund
and Louise I. Stiver

During a brief period in the late nineteenth century, a few Navajo weavers experimented with a maverick technique known as the wedge weave. Before then, no matter how brightly colored or boldly patterned, almost all Navajo textiles were woven in the standard techniques of tapestry and twill weaves, in both of which the pattern yarns are interlaced at right angles to the foundation yarns and to the main axis of the loom. Breaking with the conservative methods that had dominated Navajo weaving for two centuries, wedge weave provides a unique instance in which these yarns move, not at right angles, but diagonally across the fabric and at oblique angles to the loom.

Although perhaps best known in the context of Navajo blanket weaving, eccentric wefts are not restricted to Navajo fabrics and occur in a wide range of textiles, from pre-Columbian Peruvian garments to historic Middle Eastern kilim carpets, and to modern tapestries from eastern Europe and Scandinavia. What is uniquely Navajo, however, is the extensive use of the technique to pattern entire fabrics and to give them extraordinary visual depth.

**1. Wedge weave blanket, c.1880-1885. Type I-A. Fred Harvey collection. Courtesy Heard Museum, Phoenix, Arizona. Cat. No. 252BL. Photograph by Craig Smith.**



**2. Wedge weave blanket, c.1885. Type II-A. Courtesy University of Colorado Museum, Boulder. Cat. No. 22475. Photograph by Joe Ben Wheat.**

This short-lived and somewhat quirky style has acquired some interesting names through the years. George Wharton James, noting the predominant zigzag patterns, wrote that wedge-woven textiles (as well as certain tapestry woven ones) contained the "lightning design" (1937:122). Charles Avery Amsden, observing the deflection of warps within the weave, used the term "pulled warp" (1934:51-52, Pls. 24-25). Gladys A. Reichard called one version of the technique the "scalloped edge" and another "overstuffing" (1936:118-120). Noting the negative indentations along the sides more than the positive scallops, William H. Claflin used "knock warp" (Wheat 1973-1991).[1] George Pepper, in an unpublished 1923 manuscript once held by the Museum of the American Indian and now lost (Wheat 1990), called it "lazy weave," an inaccurate appellation for any handwork that requires considerable time and knowledge. And, referring to an entire technical class of textile construction, of which Navajo wedge weaves are one example, Irene Emery used "eccentric" to describe the movement of wefts "that deviate from the horizontal and from their normal right-angled relation to the warps" in a tapestry weave (1966:83-84). The term wedge weave, as Joe Ben Wheat notes (n.d.:162), was first used in print by Harry P. Mera (1939:3).

Wedge weaves belong to the larger tradition of late nineteenth century Navajo textiles that include standard striped wearing blankets, fancy Late Classic serapes, and Transitional blanket-rugs or rug-blankets. Aside from the distinctive warp/weft structure, their materials, construction details and basic design elements fall within the same range as other Navajo weaving. Wedge weave blankets share certain visual traits with other well-known textiles of the late nineteenth century – bands of natural-colored sheep's wool of the *diyugi* blankets, or everyday wearing blankets; eye-dazzling virtuosity of Germantown samplers and rugs; pastel colors and blocky, oversize motifs of Hispanic Rio Grande Valley blankets and their Navajo mimics. In all of these types, indigenous aesthetics (natural wools, striped and terraced motifs, optical illusions, bright colors) combine with outside influences (serrate motifs, vertical design layouts, commercial materials), resulting in distinctive Late Classic/Transitional Navajo styles. Thus, wedge weaves are at once technically and conceptually unique and closely related to other products and trends of their period.

The purpose of this article is to outline the distinguishing features of the wedge weaves' construction and design, to examine their historical background and contemporary contexts, and to explore their development and demise during the late nineteenth century. This technical and historical examination of the style naturally leads to questions about what motivated weavers to use this unusual method in the first place and why the style, once adopted, was so short-lived, lasting for perhaps twenty years at the most.

Data for this article come from our firsthand analysis of individual textiles in many museum collections, from observations and analyses made by Wheat in the course of his larger research project on nineteenth century weaving, and from our inspection of published illustrations and descriptions of still other specimens. We hope this article provides the impetus for a comprehensive survey of extant wedge weave blankets that would test the observations presented here through systematic analysis of an even more complete sample. As with all research, this study raises far more questions than it answers, and it suggests some interesting directions for future investigation. It is also our hope that this article is useful to weavers – Navajos and others – who would like to experiment with this intriguing technique.

### *Technique and Design*

Most Navajo weaving is done on an upright loom in which the warp yarns are strung vertically and kept under tension; the weft yarns are normally interlaced at right angles to these taut warps. The predominant techniques used throughout the history of Navajo weaving include weft-faced plain weave, tapestry weave with diagonal, dovetailed or interlocking joins, weft-faced twill weaves (usually 2/2 interlacing), and a two-faced weave (3/1 interlacing).[2] Two or three side cords, heav-

ier than the wefts, are usually twined along the end selvages before weaving begins; two or three cords are also twined along the side selvages as weaving progresses.[3]

Although accomplished on the same type of loom with discrete sets of warp and weft yarns, wedge weave is an aberrant variation of weft-faced plain and tapestry weaves (Emery 1966:83-84). In contrast to normal weft-faced plain and tapestry weaves in which warp and weft yarns interlace at right angles to each other and perpendicular to the loom frame, the warps and wefts in wedge weaves move at oblique angles with respect to the loom and have varied angular relationships with each other. This orientation of warps and wefts to each other and to the loom makes this a unique structure in the native weaving repertoire of the Southwest.

Aside from the basic weave, there appear to be no distinct differences in construction details between wedge weave blankets and others of the same period. The same range of selvage systems and corner finishes appears in both groups.

Most wedge weave textiles begin and end with simple bands of plain weave in which wefts are interlaced in the usual fashion, at right angles to the warps.[4] We have not examined any pieces in which the wedge weave starts without at least two to four shots of straight plain weave first. One blanket appears to have two narrow bands of 2/2 reverse twill at one end, before the wedge weaving commences; a plain weave band edges the opposite end.[5]

The formation of a small right-angle triangle in one corner of the web is the most common means of beginning the wedge in which wefts run at oblique angles to the warps, creating zigzag and other angular patterns. This is one of only two ways in which wedge weaves are structured, the second being a series of overlapping curved bands without an initial triangle. Mera describes the first technique as:

> the weaving of a wedge-like section, in the form of a right-angle triangle .... In order to accomplish the slope required by this preliminary wedge, weaving is started by first including only a few of the warp threads, and as the work continues upward, by gradually using more and more of them. Meanwhile, care is taken to keep the weft packed down to the required angle. By this method of battening, the warp is distorted from the perpendicular and passes through the weft at almost right angles to the upper edge of the wedge-shaped section (1975:43-44).

Whereas Mera emphasizes battening as a conscious means of control, Martha Stanley, a contemporary Anglo weaver and textile instructor in California notes that:

> One can also build this angle with a structural approach, by letting the threads develop this angle themselves in a sense. The weaver begins weaving, for example, increasing an additional warp thread with every second shot of weft and a certain angle develops. Were the scheme of increasing to be after every fourth shot, the angle would be steeper; if four warps were moved over every second shot of weft, the angle much shallower. The weaver makes the decision whichever route she takes. But the structural path is more the result of a collaboration between weaver and cloth (Stanley 1989).

A consequence of eccentric weaving, and a common characteristic of wedge weave, is the distortion of warps that normally run parallel to the loom's vertical axis.[6] The warps are deflected by the influence of obliquely placed wefts, because there is a tendency for both sets of yarns to retain their right-angle relationship (Stanley 1989). If the path of the warps within a wedge weave is traced, the warps are deflected from the perpendicular in a diagonal line running opposite (that is, ninety degrees) to the direction of the weft patterning.

This warp deflection occurs as a natural consequence of the diagonally placed weft yarns. The wefts' tension serves easily to move the warps out of line, just as, with a regular weave (as any weaver will attest), the unevenly tensioned wefts in a beginning weaver's work tend to pull in the selvages and make the edges come out crooked. The weaver does not have to force the warps into a diagonal position as erroneously assumed by certain authors (Kaufman and Selser 1985:138-139). Undoubtedly, one of the weave's earlier names, "pulled warp," has perpetuated this misunderstanding.

Scalloped selvages are another distinctive technical feature, caused by the skewing of warps and wefts as described above (Fig. 2). Reichard attributes the scalloping to "the fact that much weft is packed into the end triangles, more than the warp can comfortably hold" (1936:97). However, it appears that the tension caused by angling the wefts has as much to do with distorting the selvages as Reichard's "overstuffing"

TYPES OF WEDGE WEAVES

I. Banded patterns — wedge weave alternates with plain tapestry weave
   - A. Parallel diagonals in all wedge weave bands (Fig. 1)
   - B. Opposing diagonals in wedge weave bands (Figs. 8, 9)
   - C. Chevrons or zigzags created by diagonals reversing directions (Figs. 6, 7)

II. Allover patterns
   - A. Vertical zigzags (Figs. 2, 10)
   - B. Central diamonds flanked by vertical zigzags (Fig. 3)
   - C. Overlapping curved bands (Fig. 4)

III. Isolated areas within regular tapestry weave 'matrix'
   - A. Geometric motifs (may be used in conjunction with lazy lines)
   - B. Pictorial imagery (Fig. 5)

does. As Emery notes, "the warps are 'pulled' out of line and the side edges of the fabric become scalloped in the process" (1966:83-84). The extent of scalloping is directly proportional to the angle used in the wedge, and the number of scallops along the selvages equals the number of paired bands with diagonal wedge weave patterning.

In the wedge weave, technical structure and visual pattern are inextricably connected. Diagonal stripes, chevrons, zigzags and diamond designs are the natural outcome of the ways in which the wefts are interlaced in the fabric. The principal elements for most wedge weave patterning are a series of parallel diagonal stripes formed by the diagonal passage of colored wefts. Some blankets contain no more than bands of these simple diagonal stripes (Fig. 1).

From these basic diagonals, Mera describes how zigzags are formed:

> A whole series of these stripes is carried entirely across the work. When weaving reaches the other side of the loom, however, the final figure produced is not a stripe but another triangle: like the first, but inverted. At this point the fabric presents the appearance of a band composed of diagonal stripes, with triangles filling out opposite corners ... the beginning wedge of the next band is on the opposite side of the loom from the initial wedge of the first band, directly above its triangular vestige of stripe. In the second band the stripes slant in the opposite direction from those below (1975:44-45).

Diamond patterns may be created by reversing the direction of the diagonal bars at the center of a pair of wedge weave bands (Fig. 3). Because the warp yarns are deflected and the weft yarns are compacted in this central area, a structural bulge in the fabric often results from this technique. Reichard describes this effect:

> A large blanket (Plate XII,a) at the American Museum of Natural History is well designed, but its weaver, instead of allowing freedom for her "overstuffing" at the edge, "wove it in" with the result that the blanket has a series of diamonds all of which "buckle" or "gather" (1936:120).

Another salient description is given by Stanley:

> In such a case puckering is too mild a word to describe the resulting contortions. The cloth really becomes three dimensional as the warps all attempt to keep the same distance from each other yet are forced by the wefts to deflect in opposite and alternately retreating and colliding directions (1989).

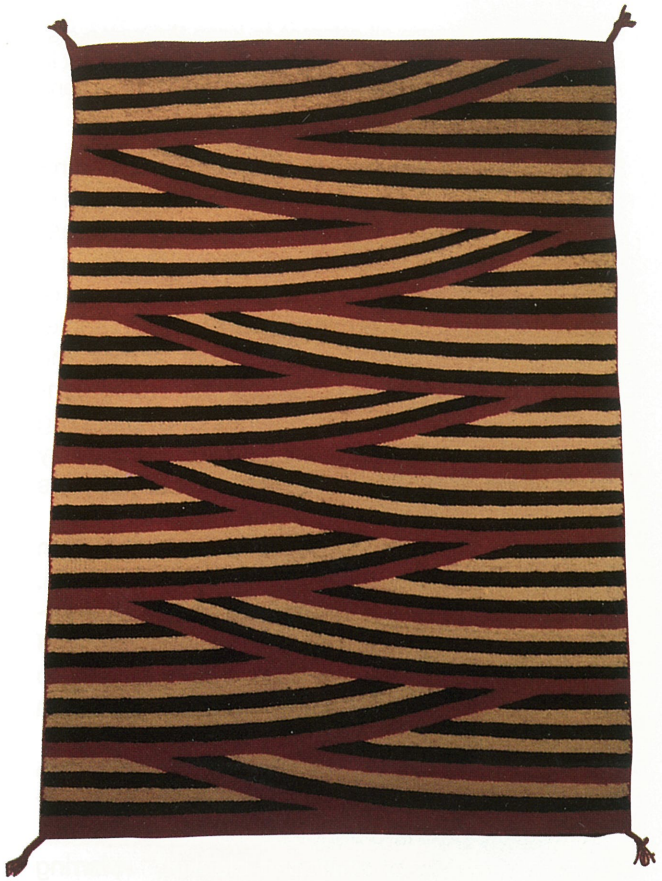
**3. Detail: wedge weave blanket, c.1875-1885. Type II-B. Courtesy University of Colorado Museum, Boulder. Cat. No. 22474. Photograph by Joe Ben Wheat.**

A second but much less common means of creating oblique angles has not previously been differentiated in the literature. Two examples of this technique are presently known (Fig. 4).[7] This method, which results in a more curvilinear design, also begins with a band of plain weave. Instead of forming a small right triangle, the initial passes of weft extend farther across the textile, as a set of slightly arched bands. These continue until they eventually form a series of overlapping curves. Wheat has likened this effect to "the weirdly eroded cross-bedded sandstone cliffs and canyon walls of the Navajo country" (n.d.:5).

The wedge weave may be used in combination with plain and tapestry weaves in varying amounts, ranging from simple bands of diagonal stripes alternating with plain weave bands, to more complex bands of zigzags also alternating with plain weave bands, to overall zigzag or diamond patterns woven completely in wedge weave.

In addition, isolated wedge-woven motifs may also be incorporated into blankets with predominant plain or tapestry weaves. Reichard suggests that such elements were the "beginnings of scalloped blanket," referring to overall wedge-woven textiles (1936).[8] It would seem that, rather than providing an early evolutionary step, however, isolated wedge weave motifs were used throughout the same period as overall wedge weaves, principally for expediency in designing. Zigzag motifs are produced easily within a framework of tapestry weave, especially where lazy lines occur. Often, simple wedge-woven elements are inserted into solid-colored areas to break up the monotony. They are also used effectively to create pictorial elements, such as the animals that appear in a blanket at the University of Colorado Museum (Fig. 5) and in many other Germantown yarn samplers.

Occasionally, a reversal of the above combination occurs and small amounts of weft-faced plain or tapestry weave are used as pattern devices in an otherwise total wedge weave. Two pieces at the Museum of Northern Arizona exhibit this in different ways. First, one-half of a blanket dated 1880 has a series of triangles composed of narrow, horizontal, tapestry weave bands in black and yellow that are used along the sides, placed inside the triangle-shaped areas formed by the zigzag of wedge weaving; in the other half of this blanket, the bands as well as the surrounding zigzags are wedge woven (Fig. 6). In a second example, the entire side selvages of a wedge weave blanket with an allover zigzag pattern are done in regular tapestry weave.[9] One wonders whether this might have been done in an effort to control the scalloped edge effect, as the selvages are considerably straighter than those with wedge weave.



**4. Wedge weave blanket woven by Glenmae Tsosie, St. Michaels, Arizona, 1970. Type II-C. Courtesy Navajo Tribal Museum, Window Rock, Arizona. Cat. No. 1970-10-1. Photograph by Russell P. Hartman.**

*Materials*

The suite of materials found in wedge weaves is identical to those in other types of Late Classic and Transitional period blankets and rugs. Handspun wool yarns of natural and dyed colors, raveled yarns, commercial cotton string warps, Germantown yarns, and even cloth-strip wefts all occur in wedge weaving. As far as we know, there are no unique materials found exclusively in wedge weaves.

Wool is the principal fiber used in all of the wedge weaves examined. The long, lustrous *churro* wool is often notable. Handspun yarns (z-spun) are used extensively for warp and weft; raveled yarns (both s- and z-spun) and Germantown yarns (both 3z-S and 4z-S) may also be found. Although we know of only a few examples that have commercial cotton string warps, there may be others, as this was a common warp material for the time period. On the other hand, wool may have been the preferred warp material in wedge weaving because it is considerably more elastic than cotton and might perhaps better accommodate obliquely moving wefts.

The natural colors of sheep's wool, some native vegetal dyes and a full array of aniline dyes are found in wedge weaving. Colors are often intense and rich, although sometimes counterbalanced with plain bands in natural colors. The use of a large number of colors characterizes many of these blankets and relates them to other tapestry weaves of the 1870s.[10] The presence of an early suite of aniline dyes first synthesized in the 1870s and applied to handspun yarn further corroborates that some wedge weaves were woven during this decade. Aniline red predominates in many pieces from the 1880s; earlier raveled red yarns may contain lac and/or cochineal insect dyes instead of aniline. Specific color schemes include one that contains red, black, brown, grey and white; and another that adds indigo blue, yellow, green and orange to the previous colors. Pastel shades of pink, purple, orange, green, yellow and tan with white are a third suite that is especially notable, and link the technique to the eastern Navajo territory, nearest to the Rio Grande Valley where weavers might have obtained such a suite of dyes from the Spanish (Wheat 1973-1991).

Analyses of the individual fibers, dyes and yarns used in wedge weaves provide useful tools for identifying and dating specific pieces and for constructing a more general history of the technique, as discussed later.

*Aesthetic Principles*

The wedge weave technique opens up a variety of design possibilities based on diagonal or oblique orientations – diagonal stripes, chevrons, zigzags, diamonds and overlapping curves, laid out in either banded or overall formats (see Table). Although fabricated by only two basic techniques, these design components can be recombined in many ways.

Within the confines of the wedge weave style, there is considerable latitude for individual expression. The widths of individual diagonal stripes and the ways in which they are executed (e.g. the presence or absence of fine outlining, color modulation and so forth) may vary considerably from blanket to blanket, or even within a single specimen. The angle of the diagonal stripes is also highly variable, ranging from condensed and shallow zigzags or diamonds to steep, vertical ones. Variations in banded designs may occur by altering the proportion of wedge-woven to non-wedge-woven portions and the amount of patterned versus solid-colored areas.

Many wedge weave designs give the impression of three-dimensionality and motion, playing foreground designs and colors against a background. For example, the overlapping curve type of wedge weave has an illusionary quality, with certain elements appearing to cross over others. Some overall zigzag patterns appear to pulsate, approaching and receding from the viewer. In others, however, the relationship between color and pattern is more ambiguous, with all receiving equal emphasis. Such optical illusion is a common element in Navajo aesthetics.

**5. Detail: pictorial Germantown blanket with eccentric wefts, c.1875-1885. Type III-B. Courtesy University of Colorado Museum, Boulder. Cat. No. 16034. Photograph by Joe Ben Wheat.**

Many wedge-woven designs appear to extend beyond the actual boundaries of the fabric's edges (Kent 1983:207). This too is characteristic of many other late nineteenth century Navajo blanket designs. None of the wedge weave blankets examined has completely enclosing borders, although, as noted earlier, all have at least a very narrow solid band along each end.

Stylistically, wedge weave blankets fit appropriately within the repertoire of other blankets made during the same time. In fact, there are many examples of banded and allover zigzag patterns that could have been created in either regular tapestry or in wedge weave. Often it is necessary to examine the specific paths of the yarns and the selvages in order to distinguish the two types. A number of especially brilliant examples relate closely in style to the subclass of Transitional textiles known as eye dazzlers. Others, more limited in coloration and patterning, are next of kin to the plainer *diyugi*, usually woven with simple bands. Blankets with banded wedge weave patterns appear to have the same rhythms (that is, the same spacing and repetition of plain versus patterned bands) as non-wedge-woven *diyugi* of the same period.

Two particularly interesting specimens that combine wedge weave and regular tapestry weave are patterned after Late Classic woman's shoulder blankets (Fig. 7).[11] In each, two panels of grey and black wedge-woven zigzagging replace the usual narrow grey and black stripes. In otherwise characteristic fashion for the women's blanket, both textiles contain three horizontal tapestry-woven panels, one at each end and one across the middle, patterned with a row of regularly repeated geometric motifs. Wedge weave elements are also used in at least one Moqui Stripe blanket.[12] Isolated only along the blanket's sides, this represents an unusual use of the wedge weave in what is in other respects a typical Late Classic textile. In those blankets that combine regular tapestry weave with wedge weave, there are no significant differences in the types of geometric motifs used when compared with blankets without any wedge weaving.

### *History and Context*

Wedge weaves date to a very limited period, from the 1870s to approximately 1890, with only a very few pieces made after that date. Thus, they are a phenomenon of the rapidly changing decades at the juncture of the Late Classic and Transitional periods.

Most wedge weaves were made in the standard sizes and serape shape (lengthwise rectangle) of wearing blankets. Some are more heavily woven and would be better classified as Transitional rugs. One unusual hall runner with simple white and dark brown zigzags measures 92″ by 31″ (Wheat 1973-1991).[13]

Because most wedge weaves in museum and private collections lack data as to when they were made or where they were first purchased, dates for most individual pieces must be attributed on the basis of stylistic and material analysis. Many times, the documentation that does exist provides evidence for collection dates only in the 1880s or later, but the pieces may very well have been made some years earlier. Fortunately, wedge weave blankets exhibit many characteristics in common with other Late Classic and Transitional period textiles, so that comparisons for the purposes of dating are not difficult. And, the small number of wedge weaves that are at least minimally documented provide a sufficient baseline to confirm the overall dating scheme.

### *Examples with Documented Dates*

The earliest known documented blanket containing wedge weave dates to sometime shortly after 1876 (Fig. 8). According to Gallegos family oral history, it was made by Guadalupe, a Navajo *criada*, or servant, living with the Dario Gallegos family in the San Luis Valley of southern Colorado. Gallegos was one of the first Spanish settlers in that area, having arrived in 1859. Donated to the University of Colorado Museum by the granddaughter of Dario Gallegos, the blanket has a series of diagonally striped wedge weave bands alternating with plain weave bands, made of very soft, lustrous *churro* wool. Among its suite of pastel colors is a synthetic orange (Orange II), which was first produced in 1876. Curiously, a few strands of cochineal-dyed raveled cloth are firmly, but seemingly accidentally, incorporated into the weave, suggesting a tie with earlier rather than later decades.[14] From this evidence, Wheat surmises that the piece was most likely made not long after 1876 (Hedlund 1990:65).

A second wedge weave has documentation that perhaps places it within the 1870s or 1880s. Recently located at the Washington State Historical Society,[15] the blanket's accession records indicate that it was

"given to Major Wm. Wirt Daugherty by Indians in the Montana territory about 1873," and donated to the museum in 1953 by his son. Major Daugherty was indeed in Montana as part of the Yellowstone Expedition of 1873-1874. However, according to Maureen Schwarz's research with documents from the Military Reference Branch of the U.S. National Archives, Daugherty had an extensive military career in the West at least from 1871 to 1888. In particular, he was stationed in southern Colorado during the end of 1879 and the first part of 1880, again in 1882-1883, and sporadically until 1888. His surviving diary for three months in 1873 makes no specific mention of his collecting this blanket, and thus there is no positive proof of its acquisition date (Schwarz 1990). Unfortunately, the blanket, with only natural white, natural brown and indigo blue handspun *churro* wools, lacks any technical characteristics that would further narrow the possible time frame.

Another blanket was collected in the early 1880s by Frank Hamilton Cushing.[16] Containing a commercial 4-ply coral red yarn among its otherwise entirely handspun yarns in natural colors or dyed with indigo and vegetal dyes, it probably dates to about 1875 to 1885, shortly before it was acquired by Cushing.

Wyoming State Museum records show that Wyoming's Governor Joseph M. Carey, who arrived in Wyoming in 1869 as the first U.S. Attorney for the newly organized territory and was active in politics and in livestock and land development until his death in 1924, collected a wedge weave blanket (Fig. 9). Wheat (n.d.:4-5;1973-1991) dates the blanket to 1875-1885 because its materials are entirely handspun in pastel aniline colors associated with Navajos who had access to the Rio Grande Valley dyes.

One particularly well-documented blanket, with a cross-bedded sandstone pattern, was collected by Washington Matthews, a U.S. Army surgeon, and catalogued into the United States National Museum (now the National Museum of Natural History) in 1884.[17] Containing fine raveled s- and z-spun, aniline-dyed yarns, it most likely dates to 1875-1880.

The Heard Museum owns a charming blanket collected by the Fred Harvey Company in 1903.[18] It contains a raveled red yarn with s-spun worsted texture along with several 3-ply commercial yarns and handspun indigo and natural wool yarns, and probably dates to 1870-1875.

Another potentially early wedge weave blanket, with raveled yarn, is reputed to have been in the collection of Taos artist Joseph H. Sharp and is now in the collections of the Woolaroc Museum in Oklahoma (Kemo Ha 1965). Although the Woolaroc's catalogue suggests a date of about 1840, it is more likely that this blanket, which includes an early aniline lavender/grey color in its allover zigzag pattern, would date to the 1870s or 1880s.

Of course, early but entirely undocumented wedge weaves also exist and can be identified, further substantiating the 1870s and 1880s as the "wedge weave decades." Kate Peck Kent postulated that a wedge weave blanket at the School of American Research with two types of raveled red and handspun indigo and vegetal-dyed yarns may also date to the early 1870s (1985:123, Fig. 51).[19]

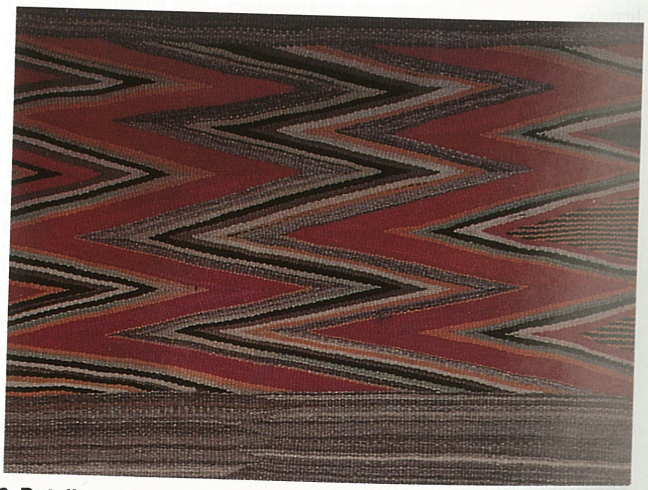
One of the latest nineteenth century examples was documented when Uriah S. Hollister collected a wedge weave at Fort Defiance in 1888.[20] According to records at the American Museum of Natural History, this blanket was new at the time of acquisition. Hollister himself reported that this "was one of the few Navajo textiles in which curves appear" (Wheat n.d.:162, citing Hollister's unpublished 1910 catalogue). Around 1896, Walter Hough collected a wedge weave that also dates to the 1880-1890 period, according to Wheat (1973-1991).[21]

### *Origins and Influences*

It is not known where this technique first began or caught hold. Wedge weaves may have been produced in several areas, but without specific documentation their origins can only be postulated. Several pieces of evidence point to the possibility of links between wedge weaving and eastern Navajo country, close to the Rio Grande Valley of present-day New Mexico.

Serrate motifs in Navajo tapestry weave were influenced by both Mexican Saltillo serapes and their New Mexican Rio Grande relatives (Wheat 1981:8). Zigzag motifs and a vertical orientation were imported notions incorporated into wedge weaves of the late 1870s and 1880s, and into the eye dazzlers of the following decades. According to Anthony Berlant and Mary Hunt Kahlenberg, "designs created in wedge-weave were direct antecedents of the vertically orientated [sic] designs of the 1890s" (1977:139).

Wheat has proposed strong affinities between Navajo wedge weaving and the Hispanic weaving tradition of the Rio Grande and San Luis valleys of northern

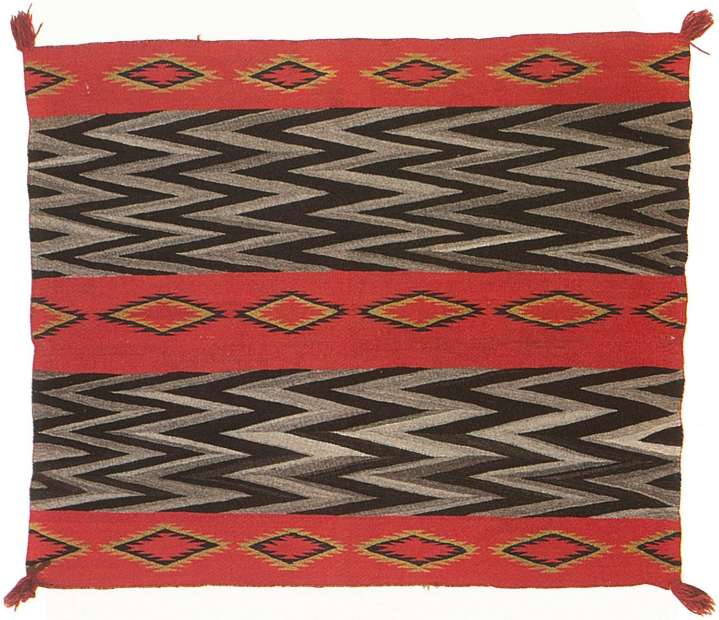


**6. Detail: wedge weave blanket with regular tapestry weave along selvages, c.1880. Type I-C. Courtesy Museum of Northern Arizona, Flagstaff. Cat. No. 2492/E3412.**

New Mexico and southern Colorado. He suggests the eastern Navajo territory near the Rio Grande Valley as a probable production area. As exemplified in the Gallegos blanket discussed above, the pastel palette of colors coupled with the soft textured *churro* wool, rather than the technique itself, contribute evidence for this proposition (Wheat n.d.;1973-1991). Further, it is possible that the Daugherty blanket discussed above, perhaps also collected in southern Colorado, may also show affinities with the Hispanic tradition through its simple white, brown and indigo blue coloration and *churro* wool.

Frederick J. Dockstader writes, "in the 1880's, Wedge Weaves were made around Fort Defiance, in the eastern section of Navajo country. Essentially, this design [an allover vertical zigzag] comes from that area, although one type is from the San Luis Valley" (1977:26). Dockstader bases this on an early discussion with Amsden, who believed many of the wedge weaves and other eye dazzlers that he had examined came from the Fort Defiance area (Dockstader 1990). As the Fort Defiance area was a prominent link in the Navajo trade network that encompassed a large area, this statement may have certain value but, lacking substantiation, it must be considered with extreme caution.

Traders who began arriving in Navajo country during the 1870s quickly got involved with native weaving. They had a marked impact not only on the materials used by Navajo weavers, but on the form and design of the textiles they bought and sold. There is, however, no indication that traders had any direct influence on or control over the technique and design of wedge weave fabrics. Certainly, no trader found the technique interesting enough to encourage or sponsor its growth. It never developed as a regional style in any particular area.



**7. Woman's wearing blanket with wedge weave, c.1880-1890. Type I-C. Courtesy Museum of Indian Arts and Culture, Museum of New Mexico, Santa Fe. Cat. No. 9100/12. Photograph by Blair Clark.**

*Decline and Demise*

During the late 1880s, handwoven textiles made the transition from supple wearing blankets to heavier fabrics more suitable for Anglo-American home furnishings — bed blankets, sofa covers and, especially, floor rugs. By the turn of the century, Pendleton blankets had virtually replaced Navajo shoulder blankets as outer garments. Rugs and curio items became the weavers' major products. The transition from home consumption and intertribal barter to commoditization and the cash economy was complete. By the end of the Transitional period (roughly 1895), traders strongly influenced the design and function of Navajo textiles.

Wedge weaves, along with other older wearing blanket styles, were no longer a significant contender for weavers' time and attention. The style apparently had always had a limited distribution. Once the local market for functional wearing blankets diminished, weavers no longer had the impetus to make wedge weave blankets.

*Wedge Weaving in the 20th Century*

Reichard (1936) noted that the wedge weave had completely died out by the 1930s. Indeed, there are only a few examples woven any time after the turn of the century, and these appear to be exceptional occurrences of the eccentric technique. Only three weavers are currently known to have made wedge weaves during the twentieth century: Sally Kinlichini in the 1930s, Glenmae Tsosie in the 1970s, and Marie Brown Shirley in the 1980s. As far as is known to the authors, all three were stimulated to make wedge weaves through exposure to nineteenth century textiles in museum collections or book illustrations.

In the 1930s, Sally Kinlichini wove a reproduction wedge weave for the Public Works of Art Project.[22] Laboratory of Anthropology records indicate that she examined the Navajo textiles at the Laboratory when she was working at the Santa Fe Indian School; it is likely that she copied a blanket from the Indian Arts Fund collection, then stored at the Laboratory.[23] Kinlichini is also mentioned in a master's thesis as the only woman during the 1940s in the Ganado, Klagetoh and Wide Ruins areas who admitted to making wedge weaves, "though most of the women understood the technique" (Anderson 1951:54-55). The same source describes her as:

> [living in the area] northeast of Ganado [probably near the community of Kinlichee], about fifty-five years old. She used to be a good weaver and had taught weaving at the Government Indian School in Santa Fe, New Mexico. While there she had become acquainted with old designs which she had seen in the museums. She thought the color photographs [which Anderson showed the weavers during the course of his investigations] should be exhibited to other women to give them new and good ideas (1951:100).

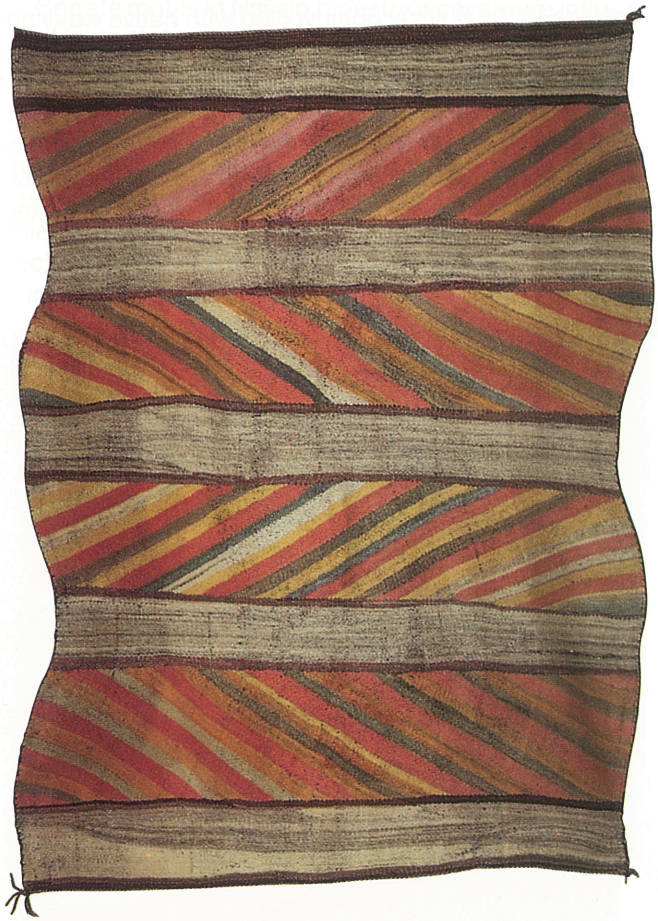
She had apparently learned from her father, "a singular circumstance" (1951:13), and had woven at least one pictorial, which depicted a tribal office building (1951:52). By 1950 failing eyesight was forcing this creative weaver to leave the craft behind and, "she has been a steady and dependable day school worker for a number of years and this work has taken up the time she might otherwise have spent in weaving" (1951:13).

In the 1970s, Glenmae Tsosie, a weaving demonstrator for the Navajo Tribal Museum in Window Rock, Arizona, made two wedge weave rugs. The first (Fig. 4) she reproduced from an illustration in Amsden (1934:Pl. 25). Martin Link, the Navajo Tribal Museum director at the time, prompted Tsosie to make this replica and many others of different nineteenth century styles by providing pictures and appropriate yarns and dyes. According to him, Tsosie had never seen a wedge weave other than in this illustration, and she took great care to keep the edges as straight as possible (Link 1979). The second rug was woven a few years later,[24] after Tsosie had seen at least three wedge weave blankets in the Los Angeles County Museum of Art exhibition, *The Navajo Blanket*, which traveled to the Ned Hatathli Gallery at the Navajo Community College, Tsaile, during the fall of 1972 (Kahlenberg and Berlant 1972:91-93). On her second try, the weaver allowed the edges to scallop more freely. Both modern wedge weaves contain handspun wool yarn that is heavy and more densely spun than were the yarns of the 1880s and 1890s. Fitting the period in which they were made, their overall weight and texture would be more suitable for floor rugs than wearing blankets.

One other contemporary example of wedge weave, in a private collection, was made in 1980-1981 by Marie Brown Shirley of the Crystal, New Mexico, area. This weaver, now in her fifties, is as eclectic in her choices of rug designs as were the previous two women. She has made rugs of Crystal, Ganado, *yei* and unique specialty styles (Getzwiller 1984:14, 30, 31, 32, 33, 35). Nevertheless, her personal expression is recognizable by the clarity of her color choices and her crisply patterned motifs, whether geometric or representational. One of her vegetal-dyed rugs, woven in a banded design most typical of the Crystal regional style, contains bands alternately patterned with tapestry weave and with eccentrically placed wefts. The latter, a subtle variation of wedge weave, forms zigzags by moving out of their right angle relationship to the warps, pulling the otherwise straight selvages subtly out of line. According to the trader who originally bought the rug from this weaver, Shirley probably got the idea from one of the many books and catalogues with which he has supplied her, but he never made a direct request for her to make a wedge weave. The idea was hers. Apparently she has attempted several other wedge weaves on a smaller scale, but none has been so successful as this one (Getzwiller 1990).

Today, most weavers and traders on the Navajo Reservation are unfamiliar with this technique. Those who are familiar with it know it only from museum collections, books and magazine pictures. Bill Malone, manager of Hubbell Trading Post at Ganado, says that he has not seen a wedge weave come through the trading post in the past five years, nor does he know of any weaver who is making them now (1988). None of the 181 weavers studied at Kinlichee works in this technique (Hedlund 1983), nor do any weavers in other communities surveyed extensively by the authors.

A very recent trend among several prominent reservation traders is to encourage weavers to make replicas of Classic and Late Classic blanket patterns. Designs from chief blankets, *biil* dresses, serapes and Germantown eye dazzlers provide the inspiration. Single-ply yarns of high quality wool are now available in several weights and in shades of deep red, dark blue and black, just as they have been for the past several years in vegetal-dyed colors. Several traders and a number of weavers profess an interest in reviving the wedge weave along with these other styles. One question on their minds is whether there will be an adequate market for a specialty item such as this.



**8. Wedge weave blanket, c.1876. Probably woven by Guadalupe, a Navajo servant of Dario Gallegos, San Luis Valley, Colorado. Type I-B. Courtesy University of Colorado Museum, Boulder. Cat. No. 18088. Photograph by Joe Ben Wheat.**

Wedge weaves, with their irregularly scalloped edges and often asymmetric patterns, do not typically fit into the commonly held twentieth century views of a good quality Navajo textile. Reichard noted that in the 1930s, "many of the Navajo women hold the edge for a fault, since they are not now accustomed to uneven edges. Their ideal is a straight edge, but it is merely a matter of taste and tradition" (1936:118-119). Reichard's Navajo weaving teachers considered the wedge weave to be "a mistake" (1936:120). Such sentiments among weavers continue into the 1990s.

Since before the turn of the century, weavers have increasingly tried to produce rugs with a conventional straight-edged appearance. Many weavers use strings or stick temples to hold out the edges of their rugs as they weave, to keep the sides straight and even. They often measure the growth of the rug on the loom, checking for any asymmetry. Looms constructed of milled lumber, metal piping and other commercial materials, with turnbuckles and more precise tensioning devices, allow for more regular products. Traders judge any rug first by its straight sides, square corners and ability to lie flat on the floor or to hang plumb on the wall. Even the criteria used to judge innovative round and cross-shaped textiles emphasize the regularity and evenness of the edges.

Another question that must be raised is whether any Navajo weaver today has the interest, time and skill to work out the wedge weave system on a commercial basis. Although it is not necessarily any more difficult, it is yet one more time-consuming variation of an already labor-intensive craft. During the course of research for this article, a number of weavers expressed serious interest in experimenting with the technique, but so far as we know none has yet completed a piece.

**9. Detail: wedge weave blanket, c.1875-1885. Type I-C . Governor Joseph M. Carey collection. Courtesy Wyoming State Museum, Cheyenne. Cat. No. M70-104-2.b. Photograph by Joe Ben Wheat.**

*Prospective Notes on the Weavers' Intent*

Why use the wedge weave technique when it is so different from any other technique in the Southwest weaving tradition? Was it a faster method of weaving? Was it conducive to specific designs? Was it particularly suited to certain uses? Were there special meanings attached to it? Although one cannot know for certain, answers to some of these questions have occasionally been the subject of speculation.

*Was it a faster method of weaving?* In 1923 George Pepper called this the "lazy weave" (Wheat 1973-1991). Amsden concluded that in order to save time and avoid constant manipulation of colors for weft, Navajo weavers used the wedge weave instead of working across the entire face of the blanket in plain and tapestry weaves (1934:52). He admits his statement is conjectural. Berlant and Kahlenberg agree with his proposition: "The wedge-weave evolved as an easy method of creating a zigzag pattern.... This saves the weaver time, as there are fewer color joinings" (1977:136, 139). Joanne Mattera states, "the process evolved in an effort to create a zigzag pattern more easily than with the traditional angle...an area normally covered by 11 shots of weft takes only six shots with the wedge weave" (1975:74). Peter Collingwood, using the same basic premise as Mattera, writes that "wedge weave is a quicker method" (1968:169).

Mera, on the other hand, probes further, asking "why a technique of this kind should have been developed remains problematical, since the care and time involved appears to have been somewhat greater than in ordinary tapestry weaving" (1975:47).

Because no known ethnographic research documents nineteenth century use of the technique and whether it was considered easier or more efficient than ordinary tapestry weave, direct experimentation may be an effective means to answer this question. Stanley initially learned the technique from Collingwood (1989:164-169) and now uses the technique extensively. She adds to this discussion:

> If one wove the same design in tapestry and in wedge weave and the color stripes were narrow, wedge weave might well be quicker. If the stripes were broad, then horizontal tapestry technique could be quicker. Thus none of us could make a clear blanket statement about speed here. The comparison is made more awkward by the fact that wedge weave and (horizontal) tapestry technique behave differently in the process of weaving them....Wedge weave is working with the bias in a sense. Thus one takes a somewhat different approach to it, and perhaps needs more experience to master it (Stanley 1989).

Even if the timing proves to be the same between wedge and tapestry, a larger question is whether efficiency is a major criterion used by weavers. Certainly to some extent, the use of commercial materials indicates that it is (Hedlund 1987). On the other hand, perhaps more important rationales exist.

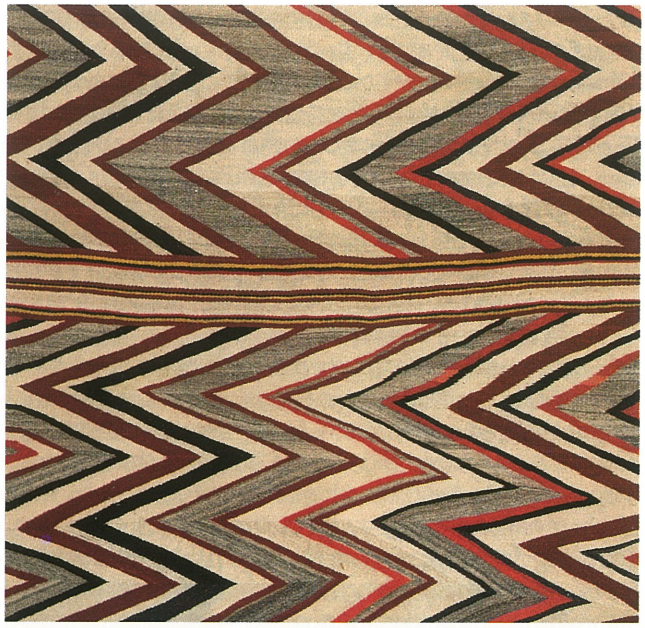
*Was wedge weave conducive to specific designs?* Certain design elements can be created in either plain

or wedge weave (Kent 1985:Fig. 50). In the School of American Research collection, a blanket with a zigzag pattern is bisected by a central band of plain weave that divides a wedge weave portion of the pattern from a tapestry weave portion (Fig. 10). As Mera notes, "It is at once evident that the zigzags of the upper portion present an appearance as good, if not better, than those of the lower section, even without considering the distortion of the edges resulting from use of the wedge-weave technique" (1975:47). There are many blankets with similar zigzag patterns that could indeed have been executed in either technique, although tapestry weave is clearly the more versatile in creating diverse types of designs. Many regular tapestry weave blankets of the early Transitional period display Late Classic motifs such as rectangles, bands, crosses, vertical zigzags and terraced stripes, combined with Transitional serrate design elements laid out in zoned, striped or paneled borderless blanket patterns. When compared with these, the wedge technique itself is usually limited to the production of diagonal motifs. Thus versatility of patterning does not appear to be the driving force behind weavers' selection of this technique.

*Was wedge weave particularly suited to certain uses?* During the Transitional period, the function of Navajo textiles changed from traditional garments and bedding for domestic use and intertribal trade, to decorative blankets and rugs that were traded or sold to an outside market. A mix of styles were made: some soft, thick wool yarns, with the feel of earlier wearing blankets, but others with firm, heavy yarns and a ruglike appearance. It is often difficult to designate any specific function to these Transitional pieces and, indeed, they may have had mixed uses.

It is likely that wedge weave blankets had functions similar to — and just as ambiguous as — those of other Transitional period textiles. Most are of relatively thick, soft, handspun fabrics similar in texture to the typical *diyugi.* Because of their construction, wedge weaves drape as though woven on the bias and therefore may have been particularly suited to wearing around the shoulders. They were probably used as bedding and for other household purposes. Their highly decorative appearance and novel construction may also indicate a certain amount of trade with the outside world.[25]

Durability does not appear to have been a major factor to those who opted to make wedge weaves, although overall texture and drapability may have been appealing features. Because of the stress created by distorting the warps, wedge weaves tend to be weak at the horizontal junction between two bands. According to Collingwood, the junction "can be strengthened if the wefts of the second band loop round different warp ends from those used by the first band" (1968:168). Navajo wedge weaves surveyed thus far do not take advantage of this technique. All horizontal junctions between bands use the same warp for each band and thus are inherently weak. Whether this matters for the uses to which these blankets were put is not known because their purposes are only speculative.



**10. Detail: blanket woven half in wedge weave and half in regular tapestry weave, c.1880-1890. Type II-A variant. Courtesy School of American Research, Santa Fe, New Mexico. Cat. No. T.367. Photograph by Blair Clark.**

*Were there special meanings attached to wedge weaves?* Beyond the explicit pictorial and sandpainting imagery used in certain rugs, it is rare that symbolic meaning is represented in Navajo textile designs. Reichard comments:

> The answer to the question "What does it mean?" is simply, "Nothing." The patterns the weavers use sometimes have names, although naming even is slightly developed among Navajo as compared with other craftswomen, for example, the basket weavers of northern California (1936:178).

She notes the lack of any emotional content in patterns with names. Recent study has further supported this lack of symbolic reference in geometric patterning (Kent 1985:110-111;Hedlund 1989a, 1989b).

The zigzags created by the wedge weave have been termed a "lightning" design (James 1937:122). Lightning and other meteorological elements play an important part in Navajo beliefs, but it is unclear how lightning and woven zigzags may be related in Navajo thought.[26]

Ironically, in her discussion of wedge weaves, Reichard suggests that "another reason why it is no longer made may be the effect of the design" (1936:119). She cites James about a man who wove a zigzag pattern:

> Before he had taken it from the loom, a storm with lightning came up. When suddenly the sun broke through a cloud, according to the weaver, it brought the pattern to life. It was as if the lightning played over this loom and he could not be rid of the blanket too soon, so he took it to a trader with the request that he do away with it (1937:122).

The particular rug in question was not made in wedge weave but in a twill weave, and it is not certain whether a wedge weave would have elicited the same response. Clearly the relationship of woven designs and symbolism is an area for further exploration.

There are a variety of other ways in which meaning can be imparted by weaving. For instance, there is evidence today that some Navajo weavers are attracted to certain innovations (such as experimental dyes, the raised outline technique, twill weaves and even re-creations of wedge weaves) because they represent technical or aesthetic challenges. Perhaps the novelty of using a new and different technique such as wedge weave, in itself, held significance for some weavers.

### *Conclusion*

The wedge weave technique has been formally described in terms of its design possibilities, historic background, contemporary applications and merits for use. Questions still remain regarding its origins and why wedge weave was an occasional choice by certain weavers; perhaps we will never have answers to these. Further research should include a thorough inventory of documented specimens in public and private collections, and a more complete comparison of these with non-wedge-weave blankets of the same periods.

Wedge weave blankets of the nineteenth century occur with little precedence, and leave only a limited legacy for twentieth century rug production. They represent an aberration in the "normal," right-angled tapestry and twill weave tradition of the Navajo. Nevertheless, wedge weaves have proven a wonderfully expressive medium for weavers who see their potential for complex combinations of pattern, color and materials.

*We are especially indebted to Dr. Joe Ben Wheat for sharing with us his extensive knowledge of Southwestern weaving in general and his observations, technical notes and slides on wedge weaves in particular; without his encouragement this article would not have been possible. We would also like to thank J.J. Brody (Professor Emeritus, Department of Art and Art History, University of New Mexico, Albuquerque) for his encouragement; Robert Gant (Museums Division, State of Wyoming, Cheyenne), Maureen Schwarz (University of Washington, Seattle), and Alice Zrebiec (Textile Study Room, Metropolitan Museum of Art, New York), for their assistance with museum documents and records; Martha Stanley, for her insightful comments based upon her own experimentation with wedge weaving; Diana Pardue (The Heard Museum, Phoenix, Arizona), Laurie Webster and Elaine Hughes (Museum of Northern Arizona, Flagstaff), Eulie Bonar (National Museum of the American Indian, New York), Lynn Brittner Hutton (School of American Research, Santa Fe, New Mexico), Lisa Whittal (American Museum of Natural History, New York), and Russell Hartman (formerly of the Navajo Tribal Museum, Window Rock, Arizona; currently with the California Academy of Sciences, San Francisco) for providing access to their collections.*

#### Footnotes

[1]Citing Peabody Museum of Archaeology and Ethnology, Harvard University, catalogue records for Cat. No. 10/9644, a wedge weave blanket from the Claflin collection.

[2]Technical terminology used throughout this paper for fabric structures is that of Emery (1966).

[3]Joe Ben Wheat has demonstrated that specific variations of the numbers of cords used and their spin/ply composition can indicate cultural and temporal origins (Wheat 1977; Hedlund 1990).

[4]In this article, we follow the convention that *bands* refer to horizontal (i.e. weft-wise), linear elements in a fabric, while *stripes* refer to vertical, (i.e. warp-wise), or diagonal linear elements.

[5]This blanket is documented in the Laboratory of Anthropology textile registration files (No. 130). Owned by the Spanish and Indian Trading Company of Santa Fe, New Mexico, in 1936, its location is now unknown.

[6]Emery notes: "The extent to which warps are drawn out of their vertical alignment by the use of eccentric wefts is seldom commented on, probably due to the fact that in tapestry the warps are not visible. However, an example of extreme divergence has been noted in an uncommon variety of Navajo 'blanket'. Usually described as either 'single wedge-weave' or 'pulled-warp weave'. Zigzag patterning (or 'lightning design') is produced by the use of eccentric wefts interworked along the diagonals of the pattern instead of by the customary use of horizontal wefts in stepped series" (1966:83-84).

[7]One of these is at the National Museum of Natural History, Washington, D.C. (Cat. No. T-1006) in the Washington Matthews collection and was first illustrated in Amsden (1934:Pl. 25). It probably dates from before 1890; the colors are apparently native and aniline mingled. The second example, made by Glenmae Tsosie of Window Rock, Arizona, in 1970 and now in the Navajo Tribal Museum (Fig. 4), is a reasonably accurate replica of Amsden's Plate 25 blanket.

[8]A wedge weave blanket illustrated in Reichard (1936:Pl IX[d]) was in the collections of the Metropolitan Museum of Art, New York (Cat. No. 10.107.11/7761) until deaccessioned and sold in a Parke-Bernet auction in March 1956 (Lot 536); its location is now unknown.

[9]Museum of Northern Arizona, Flagstaff, Cat. No. 2450/E3246.

[10]Joe Ben Wheat has counted as many as fifteen colors in one textile.

[11]One of these is illustrated here (Fig. 7). The other, from a private collection, is illustrated in Berlant and Kahlenberg (1977: 137, Fig. 56).

[12]In the Hearst collection at the Los Angeles County Museum of Natural History, this blanket (Cat. No. A.5141.42-92) is illustrated in Blomberg (1988:227).

[13]Burke Museum, University of Washington, Seattle, Cat. No. 2/1691.

[14]Tests were made by Max Saltzman (Saltzman and Fisher 1979:215).

[15]Washington State Historical Society, Tacoma, Cat. No. GA 1953.11.

[16]National Museum of American Indian (formerly Museum of the American Indian, Heye Foundation), New York, Cat. No. 9/9821, in the Frank Hamilton Cushing collection.

[17]National Museum of Natural History, Washington, D.C., Cat. No. T-1006, previously cited in Footnote 7.

[18]Heard Museum Cat. No. 187BL, Fred Harvey collection. The original price tag (in code, translated with the help of Blomberg 1988:24-25, 28) translates to a wholesale price of $71.00 and a retail price of $200.00.

[19]Because the dyes have not been tested, her analysis is not yet conclusive. It may be that perhaps 1875 to 1880 or 1885 would be an appropriate range also for this particular textile.

[20]American Museum of Natural History, New York, Cat. No. 50.1/4405.

[21]National Museum of Natural History, Washington, D.C., Cat. No. 230951.

*Wedge Weaves continued page 82*

*Wedge Weaves continued from page 65*

[22]Museum of Indian Arts and Culture, Museum of New Mexico, Santa Fe, Cat. No. 36362/12.

[23]This blanket is now part of the School of American Research, Santa Fe, New Mexico, collections (Cat. No. T.6).

[24]Navajo Tribal Museum, Window Rock, Arizona, Cat. No. 1973-28-2.

[25]This thinking is also reflected in the ways that scholars are beginning to acknowledge that fancy, so-called children's blankets of the same period may have served predominantly as trade items rather than for domestic use.

[26]In other weaving contexts, lightning is indeed important – parts of the loom receive sacred names, some of which refer to different types of lightning (Reichard 1936, title page; Franciscan Fathers 1910:222).

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