

Commercial Materials in Modern Navajo Rugs

Ann Lane Hedlund

The production of Navajo rugs is considerably more varied than suggested by common descriptions of native women shearing their own sheep, spinning their own yarn, and collecting native plants for their own dyes. Material sources for the craft, in fact, are quite diverse. Commercially prepared fibers and yarns are combined with handcrafted ones and result in rugs with a mixture of traditional and innovative materials that may bewilder the museum curator and the collector. Today, for example, there are sophisticated weavers who buy handspun yarns from other Navajo women, and there are traders who provide weavers with specially dyed yarns for custom orders.¹

The incorporation of trade goods into Navajo weaving, furthermore, is not a twentieth-century innovation.² Indeed, the very notion of weaving weft-faced fabrics, with four complete twined selvages on an upright loom with string and stick heddles, was borrowed by the Navajo from the Pueblo Indians over three centuries ago. Cotton, too, came from the Pueblos. Other raw materials were introduced to the Navajo by the Mexicans, the Spaniards and, later, American settlers and traders. Lumps of deep-blue indigo dye had been traded north from Mexico to the Southwest and used by Navajo weavers at least by the mid-seventeenth century. In that same period Spanish sheep were introduced to the Navajo for wool and for meat.

The Navajo had access to a wide array of ready-made materials in addition to imported raw materials. Lengths of Mexican, European, Middle Eastern, and American fabrics were acquired to unravel for use as weft yarn or to sew directly into garments. The earliest known example of raveled trade cloth in Navajo weaving appears in the "Patchwork Cloak," dated between 1750 and 1800 (Joe Ben Wheat, personal communication).³ By the 1820s, the Navajo had access to 3-ply European yarns. Saxony yarns, fine worsted yarns

of Merino wool with preaniline dyes, were used from the early 1800s until 1860s when coarser aniline-dyed 3-ply yarns of American manufacture reached the reservation. By the 1870s, 4-ply Germantown yarns, provided to the Navajo through U.S. government programs and later through local trading posts, replaced the 3-ply yarns. Spools of cotton string from the same sources provided the warp for many Navajo looms in the late nineteenth and early twentieth centuries. Late classic blankets from the 1870s are particularly good examples of Navajo eclecticism. At least one textile of this period uses as many as five different types of yarn, including handspun, 3-ply and 4-ply Saxony and Germantown yarns, and several types of raveled materials, and has as many as fifteen different colors (Wheat, personal communication). This paper restricts itself to a discussion of fibers and yarns. Although the trade and purchase of dyes has a long tradition among the Navajo and is a fascinating feature of today's weaving, the use of native and commercial dye-stuffs is reserved for a separate article devoted entirely to that topic.

The ability to incorporate diverse foreign materials into a native product while maintaining control over the craft's identity has its foundations in the eclectic nature of Navajo culture at large. Anthropologists examining the processes of acculturation have characterized the way in which changes occur in Navajo society, when prompted by contact with other societies, as "incorporative integration."⁴ Throughout their time in the Southwest, that is, since at least the fifteenth century, the Navajo people have added new information, objects, and institutions to their cultural repertoire while retaining an identifiable and characteristically Navajo core. Additions include elements from Pueblo religion, Spanish vocabulary, Anglo-American schools, the democratic process for tribal government, sheep, goats, cattle and horses, wage labor and the cash



Fig. 1. Rose Owens, one of many excellent weavers, combines a variety of handmade and commercially processed materials in her rugs

economy, pickup trucks and paved roads. It is important to note that such incorporation occurs particularly where the introduced product or activity shows clear economic advantages.⁵ This resourcefulness is strongly reflected in the modern weaving process and in weavers' abilities to adapt to changing ways of life on the reservation and to an evolving outside market.

Today there are perhaps more incentives than ever before for women to incorporate foreign materials into their weaving:

■ Reservation sheep have decreased in recent years,⁶ less homegrown wool is available to the handweaver, and she must

seek other material sources if she is to continue;

■ Other employment, family responsibilities and community duties compete with weavers' time. As the Anglo concept of finite time has become increasingly familiar to the Navajo, weavers recognize ready-made yarns as worthwhile labor-saving devices;

■ In an effort to further improve the quality of contemporary weaving, a few traders are exploring new fiber and dye sources and expanding their stock of raw materials, making more choices available to the weaver;

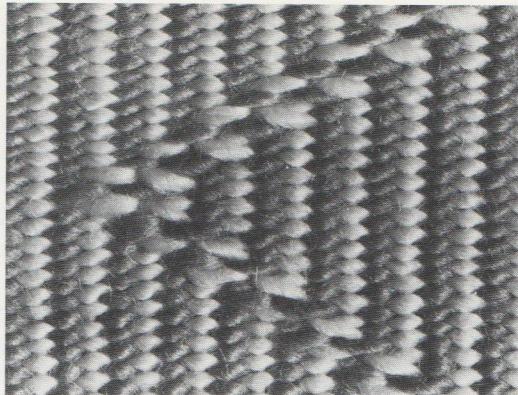
■ Many weavers now have money to purchase materials because their cash income from rugs has increased over the years, and many have additional income from jobs outside the home; in earlier years most weavers did not have the capital to invest in raw materials for a rug and had to rely solely upon their sheep herd;

■ Transportation across the reservation and to neighboring areas has improved, allowing greater access to a larger number of suppliers;

■ Finally, due to modern technology, some materials have functional or aesthetic qualities that simply cannot be produced by home methods and the craftswomen are attracted by thinner spinning, varying textures, brighter colors, lighter dyes, mothproofed wool, tangle-free skeins, and other desirable features.

Even though the types of available materials have multiplied, appropriate terms to describe them have not entered the common vocabulary of weavers, traders, and collectors of Navajo rugs. When people on the reservation speak of "yarn" as opposed to "wool," they mean commercially spun wool yarn rather than handspun wool yarn. This vernacular terminology naturally confuses buyers and other visitors who understand yarn to be any continuously twisted strand of fibers, whether handspun or commercially spun, whether wool, silk, cotton, or acrylic.⁷ Other terms such as processed wool, pre-spun, and handspun are easily misconstrued. The following descriptions are an attempt to clarify some of this tangled terminology.

Fig. 2. The sheen and smooth texture of churro (old style Navajo) sheep wool is evident in this detail of a rug (The Textile Museum 1986. 18.12) made with the Raised Outline technique. These lustrous yarns were hand-carded and handspun



Raw Sheep's Fleece

Wool, the basic ingredient for modern Navajo rugs, is itself an import to the Navajo, as sheep were introduced to them by the Spaniards. The earliest wool sheep brought to the area probably came in 1598 with Oñate's expedition to the Rio Grande Valley.⁸ These early *churro* sheep were a hardy Andalusian stock with long, smooth, and relatively greaseless wool, the perfect fiber for handspinning in an arid land. The Navajo were quick to recognize the value of sheep. Records of their acquisition of sheep from the Rio Grande Valley date as early as 1640.⁹ By 1706, many sheep and goats were in Navajo possession,¹⁰ and between 1846 and 1850 more than 450,000 sheep were commandeered by the Navajos and Apaches from the Spanish.¹¹

During the latter half of the nineteenth century other breeds were introduced to the Southwest, beginning in 1859 with Merino sheep.¹² Rambouillet, Romney, Corriedale, black-faced Karakul and others followed. Although attempts were made to improve the "native" Navajo wool, such innovations only proved to contaminate the perfectly good handspinning fleece of the original churro. Most of the sheep raised on the reservation today are a well-combined mixture of breeds, identified simply as "Navajo sheep."

In partial response to the U.S. Government's drastic livestock reduction program on the reservation during the 1930s, the Southwestern Range and Sheep Breeding Laboratory was organized at Fort Wingate, New Mexico, in 1935. A cooperative research agency established by the U.S. Departments of Interior and Agri-

culture, it represented the first significant step towards upgrading Navajo wool for reservation conditions and hand-processing standards.¹³ The project was terminated in 1967. In 1976 the Ram and Billy Import Program was established, sponsored cooperatively by the Navajo Community College, Shiprock Campus Agriculture Program, and New Mexico State University Extension Service.

Another improvement project is underway at Utah State University under the direction of Dr. Lyle McNeal. There the motto is "Save the Churro!" and an effort is being made to establish an old-style breeding flock in order to supply the best quality wool to Navajo weavers. Initiated in 1977, the project has grown to over one hundred breeding ewes, with annual wool and sheep sales.

In addition to the Utah program's churro wool, other nonhomegrown fleeces are available to the Navajo. Although not often acknowledged in the literature, it has been common for Navajo women to buy, trade, or give each other raw fleece when needed for a particular project. Also, a number of trading posts save out special fleeces with churro traits or colored wools from their annual wool purchases. The Two Grey Hills Trading Post, for instance, often has a wide array of brown and gray fleece for sale or consignment to local weavers. The challenge, however, is to find sufficient weavers who still hand card and spin the raw fleece, when products like those described next are readily accessible.

Processed Wool

Processed wool is commercially cleaned and carded sheep's wool formed into a continuous strand of loose fibers that are ready to be drawn and spun. *Sliver*, *tops*, and *roving* are terms often used loosely to describe processed wool. In industry, a sliver is "a loose, untwisted strand of fibers obtained after carding,"¹⁴ produced as an early step in the spinning process. *Tops* is a specific type of sliver known as *combed sliver* (see below). From sliver, a roving of "continuous, soft, slightly twisted strand of fibers . . . comparable in size to a thin pencil"¹⁵ is created. From the roving, commercial yarn is spun by machine.

For handspinners, spinning from processed wool eliminates most of the time-consuming tasks of shearing, sorting, picking, cleaning, and carding. The sliver comes in long, thick strands approximately ten to fifteen centimeters in diameter, wound onto a large spool or wrapped into a large ball. It is sold by the pound. To prepare it for use, a spinner unwinds a long length of the wool and splits the strand into thinner, more manageable pieces, usually about one to two centimeters in diameter. After drawing out the strand with her fingers to further attenuate the fibers, she must go through all the motions of handspinning on her traditional handspindle.¹⁶ As with hand-carded Navajo yarn, processed wool may be respun a number of times until the desired thickness and degree of twist are achieved. A popular material for making warp yarn, roving may be respun seven or eight times to make the warp extremely smooth and strong.

The resulting yarn is most definitely handspun, but simply has not been hand carded. Processed wool wefts in a rug appear far more even than the average hand-carded wool. The surface texture of most processed wools is soft to the touch, rarely hard like many kinkier hand-carded yarns. Harsh kemp wool is rarely, if ever, present. The colors are also unusually even. The grays, because of their remarkably well-blended tones, are often the first to betray their commercial origins.

The most common type of processed wool used by Navajo spinners during the past two decades is tops or combed sliver, in which the fibers are aligned roughly parallel to each other and along the long axis of the roving. In industry, tops is used to make worsted (as opposed to woolen) yarns.¹⁷ When hand spun, this wool produces a very smooth, evenly textured yarn.

A recent arrival on the reservation is a woolen type of sliver known as *card sliver* in which the individual fibers spiral around the length of the strand and lie in every direction. From mills on the Eastern seaboard, the fine, yarnlike sliver is available in skeins rather than on spools from Burnham Trading Post in Sanders, Arizona. This type of processed wool is much closer to hand-carded configurations and

so may prove to be a closer imitation of hand-carded wool with a crisper, more varied texture.

Commercially processed wool was used on the Navajo Reservation as early as 1903 when J. Lorenzo Hubbell had 47½ pounds in stock at his Ganado trading post.¹⁸ Other traders continued the experiment. J. B. Moore, who owned a trading post at Crystal, New Mexico, until 1911, sent Navajo wool for most of his competent weavers to the East for scouring and preparation.¹⁹ Moore's wife supervised the local dyeing of some of the wool. In the 1930s, Bruce Bernard, a trader at Shiprock, had Navajo wool cleaned, carded, and dyed at the Pendleton Mills in Oregon and then returned for use of local Navajo weavers.²⁰ In 1940, a short-lived wool-scouring project was carried out between Texas Technological University in Lubbock and the Fort Wingate Experimental Station in New Mexico.²¹ In 1950, the Navajo Tribal Council approved the construction and support of a wool processing plant at Leupp, Arizona. Wool roving was produced from Navajo fleeces and was distributed through reservation traders.²² By the mid-1950s the plant was no longer in operation. During the 1960s processed wool was available at the Navajo Arts and Crafts Guild (later Enterprise) through the influence of Councilman Ned Hatathli and the guild manager, Russell Lingren.

During the 1970s, efforts continued to improve wool production and to sponsor wool processing. In 1971, at a time when national wool prices were dangerously low for sheep raisers, the Navajo Tribal Council established the Navajo Wool Grower's Marketing Industry, which provided government subsidization of wool prices. In 1974, the Overall Economic Development Program for the Navajo Nation approved expenditure of \$67,000 in public works funds to establish a wool processing plant at Shiprock, and another \$25,000 in technical assistance funds for a wool marketing study.²³ By March 1976, a permanent central wool warehouse was dedicated in Shiprock, and five satellite warehouses were constructed on the reservation to receive fleeces. Although the processing plant has never been built, the tribe has been directly involved in the

wool, contracting out the scouring and dyeing, and marketing the wool to traders, weavers, and others. A portion of the wool was sent to Universal Textile and Machinery Inc., Johnsonville, South Carolina, for scouring, combing, and processing into tops and single yarns in seven colors.

"White" processed wool actually ranges from a creamy yellow-white to a stark bleached white. A full range of grays and browns, from a very light bluish gray to a charcoal gray-brown, are available. Several shades of red and a flat black are made. With the exception of white, all other colors contain some aniline dye; using the natural colored sheep's wool in industrial processing is not economically feasible. In the case of some grays and browns, natural white fibers have been blended with aniline-dyed black, gray, or brown fibers to attain an extremely even heather tone.

Although available in colors, processed wool, after spinning by the Navajo, is often dyed with vegetal or aniline dyes. Because of the wool's well-scoured nature, dyes usually take evenly and thoroughly. Weavers in the Ganado area frequently top-dye an already bright aniline red roving with packets of "Cardinal Red" to obtain a much darker shade of red, known commonly as "Ganado Red." Top dyeing over gray results in deeper heather tones.

During the late 1970s and early 1980s processed wools were especially popular. Until recently they were purchased by weavers from the Shiprock wool program or from numerous trading posts and suppliers. Their main advantage over the ready-made yarns that were then available was that the spinner could determine the specific thickness and weight of the yarn, matching it appropriately to her prospective rug project. Now, processed wool has much competition from commercial yarns, and its use has declined significantly in just the past five years. Babbitt Brothers in Flagstaff, the major wholesaler and distributor of tops for twenty years, curtailed the business in mid-1985 when other materials replaced the high demand for tops (R. Bruce Burnham, personal communication).

*Single Yarns*²⁴

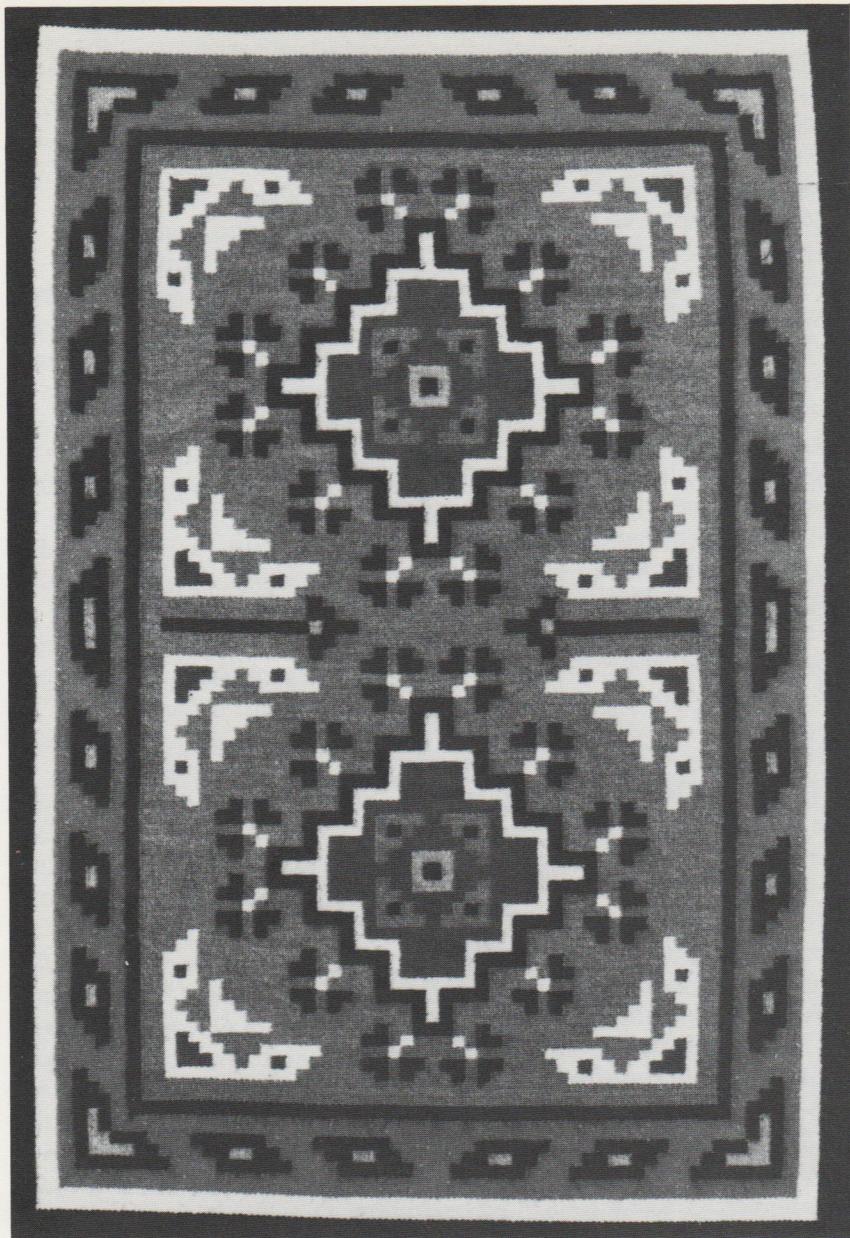
Mimicking handspun yarns, some commercial yarns are composed of a single, loosely twisted strand of wool. In the past, such yarns were available in only a limited selection of sizes. Single yarns presently available range from thick, heavy ones like Icelandic Lopi yarns (eight to ten wefts per inch when woven in a Navajo weft-faced rug) to extremely fine, wiry yarn in imitation of handspun types used in Two Grey Hills tapestries (ninety or more wefts per inch).

Reservation traders will frequently call single yarns "pre-spun wool" to contrast with "yarn," by which they mean commercial 4-ply knitting worsted, and with "wool" which implies hand-carded, handspun wool yarn.

The availability of commercial single yarns, like that of processed wool, goes back at least to the turn of the century. From this period, a few woven specimens containing a densely spun yarn with a high percentage of very coarse kemp wool are preserved. During the period between 1900 and 1970, few if any commercial single yarns were employed by the Navajo.

In the late 1970s, the Navajo Wool Growers Marketing Industry contracted with Universal Textile and Machinery and had a large quantity of Navajo sheep wool cleaned, carded, and spun to their specifications. Another batch of Navajo wool was sent to the Brown Sheep Company in the early 1980s. The single yarns from each of these projects were wholesaled to stores and distributed directly to weavers.

The Brown Sheep Company in Mitchell, Nebraska, established in the fall of 1980, is by far the largest present supplier to the Navajo through the Shiprock wool program and numerous trading posts on and off the reservation. Approximately one third of Brown's annual production, currently a thousand pounds of yarn per day, goes to the Navajo market. Although Navajo wool was experimentally used in 1984, wool is regularly bought from Nebraska, a northern Colorado, and eastern Wyoming growers and is 90 percent mixed sheep breeds. It is sent to South Carolina for washing, combing, and carding, and returned to Nebraska as tops. Brown's then spins the wool and dyes it. The yarns most commonly sent to



Above Fig. 3. A Two Grey Hills rug (*The Textile Museum* 1982.23.2) by James Sherman, one of several dozen known male weavers on the reservation

Right Fig. 4. The slightly nubby brown wool, visible between the two black corners, was hand-carded and handspun, while the gray wool was commercially cleaned, blended and carded and probably also handspun. Detail (*The Textile Museum* 1982.23.2)

the reservation come in two weights—a medium weight "worsted" and a finer "sports weight." The company also makes a hundred-percent wool single-warp yarn and recently began manufacturing a seventy-five percent wool, twenty-five percent mohair, warp. In addition to natural white and grays, the company offers approximately sixty skein-dyed aniline colors, many that are similar to shades traditionally obtained with vegetal dyes (Mrs. Harlan Brown, personal communication).

R. B. Burnham & Co. Trading Post in Sanders, Arizona, is Brown's largest customer on the reservation, distributing to approximately thirty other stores who in

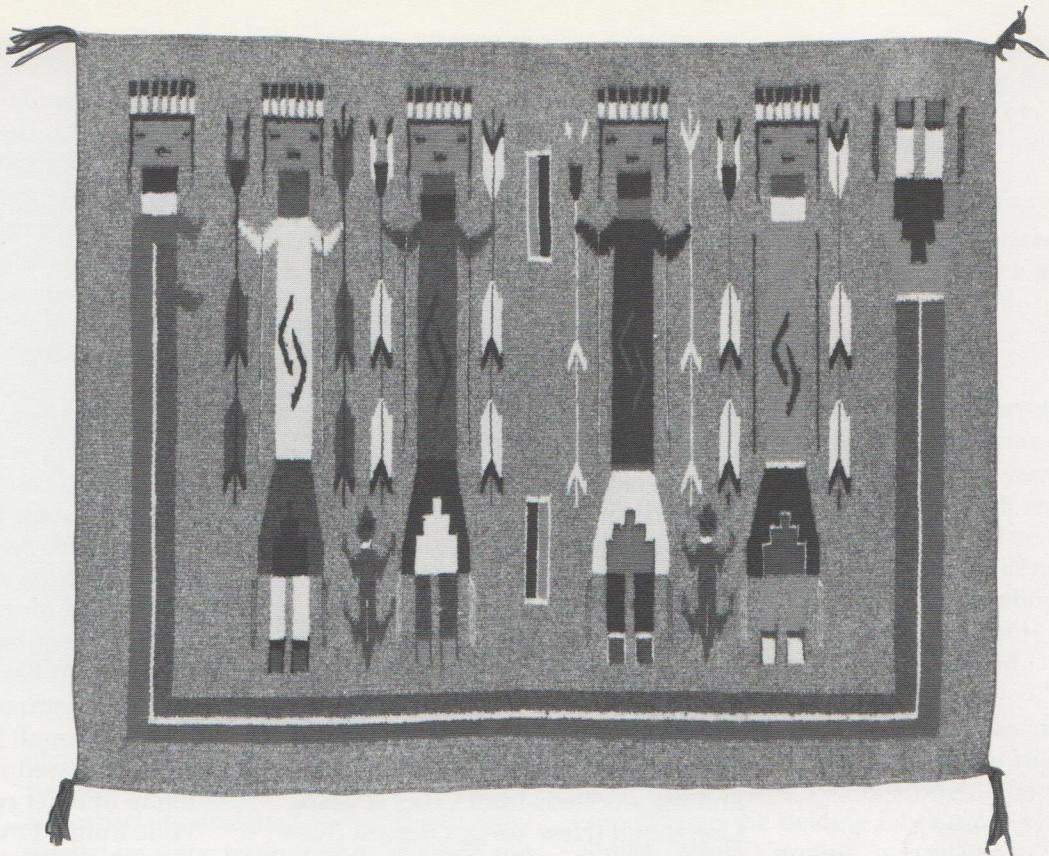
turn also sell to Navajo weavers. In 1984 and again in 1985 Burnham's purchased over 116,000 skeins, representing approximately half of the commercial wool yarn available on the reservation (R. Bruce Burnham, personal communication).

In addition to wholesaling these yarns to other stores, fourth-generation trader Bruce Burnham provides Brown's white and gray yarns to expert Navajo dyers who then produce an impressive array of colors from plants and other materials. A ledger is kept on how much yarn goes out to each person and the quantity of specific colors that are returned. Dyers are paid by the skein. According to Burnham, some women can dye up to twelve hundred skeins in a single week, although a standard dye lot contains ten four-ounce skeins. This yarn is provided to weavers for special rug commissions and sold through Burnham's post.

Burnham has experimented with other materials. Of especially promising nature is the worsted sliver, actually more like a single yarn, just being introduced in four different weights and eight or nine colors (see discussion above under "Processed Wool"). For a brief period, a very fine British single yarn that could make tapestries with 145 wefts per inch was offered through Burnham's. And both Australian and New Zealand wools and milling systems have been examined with an eye for their Navajo utility.



Fig. 5. Pictorial rugs like this one (The Textile Museum 1982.23.3) commonly contain commercial 4-ply yarns, often in bright colors. The figures here are yei, Navajo holy people, frequently depicted in traditional sandpaintings. Woven by Daisy Barton



In addition to commercially spun yarns, a limited amount of handspun single yarn can be bought by weavers who do not want to make their own or use machine-made products. A number of the best weavers on the reservation standardly commission other weavers to spin particular types of yarn for them. Payment may be in cash or in the form of a trade. Handspun weft yarn is a rare commodity at trading posts, but it is not unusual to see several balls of handspun warp yarn for sale in a store's display case.

Multiple-ply Yarns

Compound yarns made up of more than one strand of wool twisted together are technically termed *plied* and are often described according to how many strands are combined.²⁵ For example, 3-ply yarns are composed of three separately spun strands that have been twisted together for added strength, weight, or texture. The Navajo produce handspun, hand-plied yarns exclusively for the heavy cords that are twined along the ends and sides

of a rug. Otherwise, all handspun yarns used in Navajo rugs are singles (that is, not plied at all).

Multiple-ply yarns of outside manufacture are not new to the Navajo:

Throughout the Spanish period, commercial yarns were standard items of commerce in New Mexico. Wool and silk yarns from Europe and China, and from Mexico itself, reached New Mexico through the annual supply trains and the trade fairs. After 1821, the supply of yarns increasingly came across the Santa Fe Trail. Saxony yarns, a fine 3-ply spun from Saxony Merino sheep, dyed with indigo, cochineal, madder, and other commercial dyes of the day, was one of the main yarns imported, and while it was commonly used in Spanish-American weaving for decorative detail, it does not seem to have been much used by the Navajo until late Classic times, that is, from about 1845 to 1865. During that period, it was employed fairly often, and a number of blankets were made entirely from Saxony. After the commercialization of aniline dyes in 1856, another commer-

cial yarn made its appearance among the Navajo. This was "Early Germantown" yarn, like Saxony, of three plies, but dyed with aniline dyes in a wide variety of colors. Most of these yarns are either very dull yellows, greens, browns, and lavenders, or highly saturated orange-reds, blues, and yellows, but of little luster. They were in use by 1864 and continued in use until about 1875, when they were increasingly displaced by 4-ply "Germantown" yarns of the same character.²⁶

By the 1890s the use of 4-ply Germantown yarns in a wide array of strong aniline colors prompted the appellation "eye dazzler" to describe the brightly patterned textiles often made exclusively with commercial yarns. Although discouraged by many traders and collectors, the use of bright, commercially plied yarns has continued into the twentieth century in certain rug styles discussed below.

The plied wool yarns most commonly available to the Navajo today are 4-ply knitting worsteds from Coats & Clark, Lion Brand (New York), Orchard (New York), Maypole (Portland, Oregon), and Dawn (Stamford, Connecticut). They are sold in four-ounce skeins, and over thirty colors can be counted on many suppliers' shelves.

Knitting worsteds, despite their name, are soft and lightweight; without further treatment they will not pack well into a woven rug. A weaver must tighten the yarn's twist and make it denser before using it. The tightening is done by respinning the yarn on a hand spindle. For warp yarns, the respinning may be repeated, just as with hand carded or processed wool warp, until a very strong, smooth cord is produced.

A number of modern rug styles allow for the relatively consistent use of commercial 4-ply yarns as weft.²⁷ Retwisted commercial yarns are typically found in rugs known for their bright colors—the Teec Nos Pos serrated outline pattern, in *yei* and *yeibichai* rugs, in some novelty pictorials, and formerly in Raised Outline rugs. In warp-faced sash belts, 4-ply commercial yarn has been the standard since the nineteenth century. On the other hand, although increasing amounts of both processed wool and single yarn are found in other rug styles such as Ganado, Wide Ruins, Pine Springs, Burntwater, Crystal, and Two Grey Hills, commercial plied yarns are *not* currently accepted in these rugs by traders, arts and crafts show judges, and collectors.

While most of the yarns mentioned

Fig. 6. Protecting her loom from the summer sun and rains, Della Woody is weaving underneath a pickup truck camper top propped up next to her house



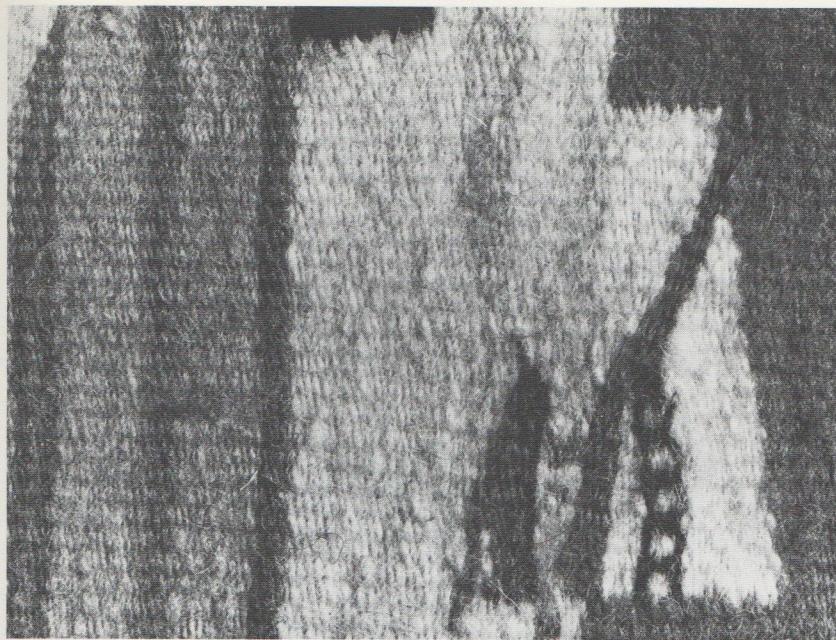


Fig. 7. Super-fine tapestries are characterized by thread counts of over 90 wefts per inch. This detail of Della Woody's fine *yeibichai* tapestry (The Textile Museum 1982.23.4) contains a commercial camel-brown colored wool yarn that appears as wider stripes on the left. Originally a 4-ply yarn, it has been split apart so that separate strands may be used as fine wefts. The yellow and white yarns, visible in center of photograph, are probably hand-carded and handspun, while the red-brown and green may be commercial acrylics. Weft shown vertically to correspond to orientation of full-view design

above are used as weft, spools of tightly twisted, creamy colored 4-ply wool yarn are especially designed for warp and are carried by some trading posts through the Shiprock wool program. A synthetic fiber is used in another plied warp yarn. Extremely strong and smooth, this yarn has a bluish-white cast and can be identified by its shiny cellophane-like appearance under magnification.

A few other multiple-ply yarns appear in Navajo weaving from time to time, some of them from major mills that cater to the Anglo handweaving population. On the northern reservation a number of posts owned by the Foutz and Kennedy families, for instance, stock 2-ply yarns in a rainbow of colors from Condon's in Canada. Several years ago, a weaver living on the southern edge of the reservation received a gift of several handsome skeins of another 2-ply yarn, obtained from a Texas handweaving shop. She wove these into a handsome *yei* rug that would defy most curators or collectors to identify the yarn source.

For extremely fine tapestry-grade textiles (with more than 90 wefts per inch), plied yarns are often split apart so that a fine single strand can be used for weft. These too are extremely difficult to identify. While splitting plies is a time-consuming process for the weaver, it is relatively easy when compared with the skill and

concentration involved in handspinning a superfine yarn. Although extremely fine handspun yarns are still produced by some, the practice of splitting plied yarns has gained popularity among weavers who make tapestries in the Two Grey Hills style, superfine *yeibichai* pictorials, and miniature rugs measuring only a few square inches.

Cotton String

Joe Ben Wheat has calculated that between 1863 and 1878 approximately two thousand pounds of commercial cotton yarn was provided to the Navajo through federal government annuities. By the late 1870s, cotton warp was a standard item at trading posts. The Hubbell Papers show that cotton string was a common commodity at Ganado between 1884 and 1903.²⁸

Although dealers commonly discourage its use and pay lower prices for rugs with string warps, cotton string on large spools from the Belding Lily Company in Shelby, North Carolina, is available in many reservation stores today. Many small rugs, and samplers of lesser quality, contain cotton warps.

Cotton and wool possess contrasting qualities that explain the weavers' attraction to cotton and the traders' and collectors' preference for wool.²⁹ First, cotton string is ready to use as warp yarn, straight from the spool, and its twist does not have to be tightened as does that of wool yarn. This time-saving aspect of cotton string is complemented by the fact that cotton does not stretch like wool, and so there are fewer tension problems on the loom. It is easier to make a straight-sided rug with string warps (but cotton is also less forgiving when mistakes are made). Commercial tests show that dry or wet cotton is stronger than wool, so warp breakage is decreased. But then cotton has much less resistance to abrasion, so it is weaker in the long run because warp threads must withstand constant beating and scraping during the weaving process and further wear in a completed rug. Cotton is not as flexible a foundation material as wool, making a rather stiff rug. Finally, despite its longstanding history in the Southwest as a native fiber, cotton does not share the "traditional" and "authen-

Fig. 8. Evelyn Curley is weaving a crisply designed Ganado Red rug of fine tops wool that she handspun and overdyed to make the color richer. Ganado Red rugs are well integrated into the "tradition" of Navajo weaving even though they derive from a trader's suggestions in the late-nineteenth and early-twentieth century and are based on an imported synthetic red dye



tic" connotations that are associated with Navajo sheep's wool.

Synthetic Fibers

Synthetic knitting worsted is a common item on trading post shelves. Ostensibly for knitting and crocheting projects, it is also used by weavers who retwist it for both warp and weft. The most popular type is a hundred-percent acrylic, although acrylic/nylon and rayon/cotton blends are also available. All three are 4-ply yarns.

Despite the complaints of rug buyers, the comparatively low cost of synthetics (less than half the price of wool) increases the appeal for these "counterfeits," as the auctioneer for the Crownpoint Weavers Association, Hermann Coffey, calls all commercial yarns. The shiny appearance, intense colors, and cool feel of most synthetic yarns are a clue to their presence. However, recent improvements in manufacturing processes make it increasingly difficult to detect synthetics without magnification or analytical tests.

Synthetic materials often appear as small color accents in rugs made predominantly of wool yarns. Like other commercial yarns, they also appear frequently in beginner's rugs, where more expensive

yarns might be wasted.

In the late 1960s, Glenmae Tsosie, a weaver from St. Michaels, Arizona, who worked as a craft demonstrator at the Navajo Tribal Museum in Window Rock, did some unique experimental weaving with synthetic yarn. Martin Link, then director of the museum, bought a quantity of shimmery synthetic yarns, probably an acrylic/nylon blend, and presented them to Glenmae with instructions that she weave them into the most atypical, non-traditional Navajo design that she could imagine. The result was a surprising Mondrian-like geometric arrangement of blocks. Several rugs were made in this style, two of which are in the collections at the Navajo Tribal Museum and one at the University of Colorado Museum in Boulder.

Another experiment at about the same time involved unspun sliver of synthetic fibers, which is rare on the reservation, although weaving supply stores sell it in other parts of the country. In the mid-1960s, Russell Lingren obtained a sample of unspun synthetic which he gave to Bertha Shaw, an expert weaver. She experimented with native dyes on the synthetic fibers and obtained a subtle palette of colors. She spun and wove them

into several handsome rugs that are now part of the Navajo Tribal Museum's permanent collections. According to Mrs. Shaw, the fibers were extremely difficult to handle for they did not take the dyes well, were stiff to spin, and had to be cut with scissors rather than broken by hand. So far as is known, no one else on the reservation has experimented with unspun synthetic fibers.

Other Fibers

Although imported silk is found in a number of nineteenth-century Navajo blankets,³⁰ no recent work has been done with this fiber. Similarly, linen, so far as we know, has not been used in twentieth-century Navajo rugs.

Conclusions

One of the more pressing issues for both individual and institutional collectors concerns whether the value of a rug depends upon the materials incorporated into it. Discussions of the relative merits of hand-processed versus commercial materials go unabated among weavers, traders, dealers, gallery owners, arts and crafts fair judges, museum curators and private collectors. While it is indeed difficult to identify accurately the source of every yarn in a modern rug, it is hoped that the preceding descriptions provide some information on which readers may make their own observations.

It is natural for us to value highly a large hand-carded, handspun, hand-woven rug that has taken a great deal of time, energy, and skill to produce. The purist's approach—favoring exclusively hand-processed materials—however, is hardly practical today. Native textiles, like the products of other vital crafts, should be judged on a full assessment of their aesthetic, technical, and cultural features, not just on the absence or presence of materials such as those described in the previous pages. Trade materials, as we have seen, are no newcomer to Navajo weaving and are probably here to stay. They have, in fact, become a genuine part of the tradition of weaving. Moreover, they are a key to the continuation of the craft as they give prospective weavers the option of weaving without the time-consuming basic preparation.

Navajo weaving has a vitality because of the weavers' abilities to incorporate and adapt varied materials and designs into their rugs, because of "the resistant institutional core at the heart of Navaho culture . . . that has formed a coherent and distinctive Navaho pattern since at least about 1700."³¹ Today, the craft is flourishing not in spite of the "counterfeit" yarns but in part because of such new and innovative materials.

Notes

1. Non-native goods obtained by the Navajo Indians through sale, trade, or gift are referred to here as commercial, trade, or foreign. Such goods may be raw materials or products partially or completely manufactured by hand or by machine.
2. Dr. Joe Ben Wheat has carefully documented the extensive use of imported materials in the native Southwest ("Documentary Basis for Material Changes and Design Styles in Navajo Blanket Weaving" in *Ethnographic Textiles of the Western Hemisphere*, ed. Irene Emery and Patricia Fiske [Washington, D.C.: The Textile Museum, 1977], and is currently working on a major summation of his textile research in "Blanket Weavers of the Southwest," forthcoming. Kate Peck Kent has summarized Navajo textile history in *Navajo Weaving: Three Centuries of Change* (Santa Fe: School of American Research Press, 1985). I am indebted to both scholars for our discussions regarding textiles, many of which have focused upon the materials of Navajo weaving and their historical significance. Kate died on 28 October 1987. Her contributions both as a scholar and humanist will have a lasting impact on all of us in the field.
3. See also Wheat, "Navajo Blanket Weaving," 426.
4. Edward H. Spicer, ed., *Perspectives in American Indian Culture Change* (Chicago: University of Chicago Press, 1961), 529, 530.
5. Evon C. Vogt, "Navajo," in *ibid.*, 325, 326.
6. See Ann Hedlund, "Contemporary Navajo Weaving: An Ethnography of a Native Craft" (Ph.D. diss., Department of Anthropology, University of Colorado, Boulder, 1983), 106-108.
7. Irene Emery, *The Primary Structures of Fabrics* (Washington, D.C.: The Textile Museum, 1966).
8. From Wheat's manuscript on "Blanket Weavers of the Southwest," forthcoming.
9. Charles W. Hackett, *Historical Documents Related to New Mexico, Nueva Vizcaya, and Approaches Thereto, to 1773*, 3 vols. (Washington D.C.: Carnegie Institution, 1937).
10. Willard W. Hill, "Some Navajo Culture Changes During Two Centuries," in *Essays*

in Historical Anthropology of North America, Smithsonian Miscellaneous Collections 100, 395-415.

11. Richard Van Valkenburgh, "Dine Bikayah: The Navajo Country" (unpub. ms., Navajo Agency, Office of Indian Affairs, Department of the Interior, Window Rock, Arizona, and Vogt, "Navajo," 296).
12. Edward N. Wentworth, *America's Sheep Trails* (Ames, Iowa: Iowa State College Press, 1948), 237.
13. James O. Grandstaff, *Wool Characteristics in Relation to Navajo Weaving*, Department of Agriculture Technical Bulletin (Washington, D.C., 1942), 6.
14. Phyllis G. Tortora, *Understanding Textiles*, 2d ed. (New York: Macmillan, 1982), 426.
15. Norma Hollen and Jane Sadler, *Textiles*, 3d ed. (New York: Macmillan, 1968), 94.
16. Courtney R. Jones, "Spindle Spinning: Navajo Style," *Plateau* 18 (1946): 43-51.
17. Hollen and Sadler, *Textiles*, 94.
18. Hubbell Papers, Special Collections, University of Arizona Library, Tucson. See also Wheat, forthcoming.
19. Wheat, "Navajo Blanket Weaving," 9.
20. New Mexico Association on Indian Affairs, 1932 Field Report, 22 January 1932.
21. Jon T. Erickson and H. Thomas Cain, *Navajo Textiles From the Read Mullan Collection* (Phoenix: The Heard Museum, 1976), 71.
22. Lowell E. Anderson, "Factors Influencing Design in Navajo Weaving" (Master's thesis, Department of Decorative Art, University of California, Berkeley, 1951), 90.
23. Navajo Tribe, *The Navajo Nation Overall Economic Development Program* (Window Rock, Ariz.: Office of Program Development, The Navajo Tribe, 1974), 151.
24. Irene Emery, *Primary Structures of Fabrics*, 13, discusses the terminology of simple yarns of one strand. Among the various alternatives—single, single yarn, and single-ply yarn—her preference is for the use of "single yarn." This is the term employed here.
25. *Ibid.*, 10.
26. Wheat, "Navajo Blanket Weaving," 422, 423.
27. For a description of the basic rug styles found on the Navajo Reservation today, an updated reference is Bill Bobb and Sande Bobb, *Navajo Rugs—Past, Present and Future*, rev. ed. (Santa Fe Heritage Art, 1984), 70-85.
28. From the Hubbell Papers, Special Collections, University of Arizona Library, Tucson, as cited in Wheat, forthcoming.
29. Michael M. Bogle, "Technical Data on Wool Textiles," *Textile Conservation Center Notes* 2 (North Andover, Mass.: Merrimack Valley Textile Museum, 1979); *idem*, "Technical Data on Cotton Textiles," *Textile Conservation Center Notes* 3 (North Andover, Mass.: Merrimack Valley Textile Museum, 1979).
30. Wheat, "Navajo Blanket Weaving," 423.
31. Vogt, "Navajo," 326, 327.