Plain Weave—not so plain as you may think!

**Plain Weave:**
Plain weave is the most basic weave structure: the weft travels over and under alternate warp threads on one pick and then under and over them on the next. It takes 2 "controls" on the warp to produce plain weave. The controls can be shafts, string heddles, a rigid heddle, sticks, or the weaver's fingers, so any loom can produce it. The controls are set up so that one raises or lowers the odd-numbered threads in the warp, and the other the even-numbered threads.

Plain weave makes the thinnest possible fabric that a yarn can produce, and it has the most stable interlacement of any weave structure. Its regularity and consistent texture makes it a very useful foundation for all kinds of further embellishment.

*The unlimited variations of true plain weave are achieved not through changes in structure, but through the use of color, warp and weft size, sett, or a combination of these.*

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**DESIGN ELEMENTS**

**Sett**
The sett is the spacing between warp threads; it is designated by *ends per inch* (epi). The weft sett (*picks per inch* or ppi) is the density at which the weft interlaces with the warp and is dependent on the warp sett. In fact the amount of space between the warps determines whether the warps and weft will be equally visible or if the warps or the wefts will be dominant.

Although sett is a continuum, cloth density can be divided into 3 groups with distinct characteristics:

*Balanced*
Warp and weft are balanced and equally visible on the face of the cloth. The space between the warps allows the weft to pass between them as it moves over and under the warps.

*Warp-faced (warp-dominant)*
Only the warp is visible; the weft "tunnels" through the warps producing horizontal ridges. The warp is sett so close that the weft cannot pass over or under warps, but instead forces the warps to the front or back of the cloth.

*Weft-faced (weft-dominant)*
Warps are spaced so far apart that the wefts can bend completely around the warps, nest together, and completely cover the warp, which is invisible, but produces vertical ridges in the cloth.

Balanced setts produce flexible, drape-able fabrics. Unbalanced setts are stiffer and less pliable; they tend to bend only along their ridges, and are used for textiles that need to lie flat like rugs and mats.

Whether the sett is balanced, warp- or weft-faced has a major influence not just on the appearance of the plain weave, but on the effect of the other design elements as well.

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Color
Because the eye is naturally drawn to it, color trumps every other design element in a cloth. Balanced setts with one color in the warp and another in the weft will blend optically to produce a third color that may or may not be what is expected.

When more than one color thread is used in the warp with a solid color weft, it produces a pattern of vertical stripes. More than one color in the weft-wise direction are technically called bands, although the term horizontal stripe is also used. When stripes and bands of color are woven together, the resulting pattern is a plaid.

Color can be employed as a weaving design element in so many ways that it can be a lifelong study.

Yarn Size and Texture
Plain weave lends itself particularly well to textured yarns and yarns of varying sizes. A principle of textile design is that a simple weave structure like plain weave shows off a fancy yarn much better than a more complicated weave structure, which will compete with a fancy yarn to the detriment of both. The guideline is, Fancy yarn/simple weave; Complicated weave/simple yarn.

Among other design possibilities, a combination of different sized warp and/or weft yarns can produce textural stripes or plaid. Another texture variation involves equalizing the sizes of yarns by doubling or grouping multiple strands of finer yarns until the bundle is equal to the size of the larger yarn.

Weaving with a very fine weft is one way to emphasize a special warp, without losing pliability. Most weft-faced fabrics are woven with heavier wefts on strong smaller, strong warp thread.

Thick yarns alternated with thin yarns in (usually) weft.

Embroidishments Applied by Hand as the cloth is formed
The very uniformity of plain weave encourages the addition of hand-worked decoration as it is woven. Many different kinds of effects have been developed.

• Open-work effects that mimic lace by manipulating warps and wefts to distort the rectilinear pattern of plain weave.
• Insertion of supplementary wefts to produce patterns for decorative effects, essentially embroidery applied as the web is created.
• The use of discontinuous wefts (wefts that do not necessarily pass from selvedge to selvedge).

Combining Design Elements in Plain Weave
Different combinations of the design elements with plain weave over the millennia that plain weave has existed have produced a vast number of specialized, named techniques that use the plain weave structure. On the next pages, are some of these plain weave patterns that have acquired names of their own.

Color-and-Weave
Balanced plain weave with small stripes (usually 1 to 4 threads) of alternating colors woven in the same or different alternating color sequence in the weft to produce pinstripes (alternating horizontal and vertical pinstripes in groups produces Log Cabin) and small checks or stripes. Color-and-weave is not limited to plain weave (the same techniques in twill produce "glen checks"), but its use in plain weave is the most common.
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Inkle Bands
Warp-faced plain weave, usually on an inkle loom, although you can. The patterning is produced by different colors in the warp. Multiple warps the same color produce stripes. Two strands of warp produces a wavy line. Alternating colors produces horizontal bars in which one color is on the face of the fabric on one pick and the other on the face of the fabric on the next pick.

Warp Rep
Warp-faced plain weave with warp stripes and alternating thick and thin wefts. When woven, the color the thick weft passes through is emphasized while the warps over the thin wefts are minimized. By changing the shed that the thick weft passes through, it is possible to change the dominant color, so that blocks can be woven.

Warp rep can be expanded to more shafts to weave more complicated block patterns.

Hand-worked Effects
The weaver is the most powerful tool in weaving. Many techniques require the weaver’s hand and cannot be loom-controlled. The uniform texture of plain weave provides a perfect background for many of these techniques.

Tapestry
Weft-faced plain weave, woven using multiple colors of discontinuous wefts (which are often composed of multiple colored threads for effect) to produce weaver-designed and controlled images ranging from representational to geometric to abstract.

Tapestry is an "art weave," as it is very painterly and allows the weaver the freedom to weave anything that can be imagined.

Inlay and Transparencies
Related to tapestry, although usually less representational than geometric or "folk-art-like," in the inlay technique (also called brocade) a supplementary pattern weft that is often larger and usually contrasting in color is laid in and tied to foundation fabric of balanced plain weave. The supplementary weft usually doesn’t travel selvedge to selvedge. In the simplest type of inlay, the pattern weft is inserted into the same shed as the background fabric, as shown in the diagram at right.

Transparencies are made the same way, except that the background fabric is sett very openly, and the inlaid areas are more opaque.

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**Inlay, continued**
Other types of inlay produce embroidery-like patterns, the difference being that the "embroidery" occurs as the fabric is woven.

At left is a diagram of wrapped inlay, which is similar to the satin stitch of embroidery. At right is inlay known as *dukagang*, in which the pattern weft is laid into a special shed in which every fourth thread is raised, producing the "straight little paths" of warp in the cloth which is the meaning of dukagang, and which has a similar appearance to some loom-controlled supplementary weft pattern weaves.

**Handworked "Lace" Weaves**
Unlike inlay, the techniques used in handworked "lace" weaves deliberately distort the warp and/or weft threads of the balanced plain weave to make openings or lacy holes in the plain weave. To emphasize the lacy textures, smooth yarns in light colors tend to be the types used for all lace weaves.

In the three techniques illustrated below, the lace is produced by wefts. In *Spanish lace* and *Brook's bouquet*, the manipulated weft is the same weft used to weave the plain weave. For Spanish lace, several picks of weft are woven into a section of the warp before proceeding to the next section. In Brook’s bouquet, a weft is wound around a section of warps and drawn tightly together, producing a lozenge shape and a little windowpane opening when it is repeated. In *Danish medallion*, a second, heavier weft is looped and knotted around sections of plain weave to produce openings between them.

Both the sturdiest and the most open of the handworked lace weaves, *Leno* and *Gauze* form openings by twisting warps around one another to make a "twist shed" and holding them in place with the weft. A pick thrown through an "untwist" shed restores the orientation of the warp threads. Leno is bands of leno twists alternated with plain weave; gauze is all leno twists with little or no plain weave. There are many different ways to form the twist shed: on an open shed, or a closed shed, and by twisting different numbers of warp threads around one another. The illustrations below both show leno on an open shed; at left one warp is twisted around another while at right two warps are twisted around two others to make a larger opening.

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Plain Weave Bibliography

We have barely scratched the surface of the techniques mentioned here. For more detailed information and specific instructions for how to do them, the following books are recommended.


