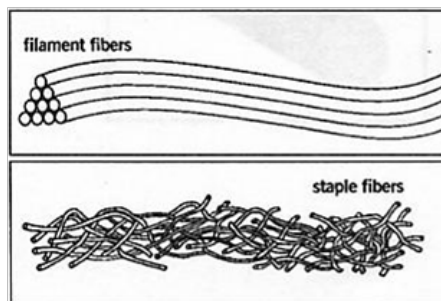


Yarns Part 1: Introduction & Spun/Staple

Yarn is the second fabric equation variable. The fiber determines the process used to make a yarn. Yarn type is selected to give the fabric varying degrees of strength, texture, stretch, and/or appearance. We'll look at a simple category system for yarns: spun/staple, filament, and complex/novelty. The yarn processes and types described in this short web class are used in commercial fabric production. If you are interested in handspinning your local textile arts community probably has classes available for crafters.

Categories (overview):

Spun/Staple, Filament, Complex/Novelty



Complex/Novelty example
Source: I, Malzees, CC BY-SA 3.0
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<https://commons.wikimedia.org/wiki/File:HandspunYarn.JPG>



Spun/Staple:

- Short natural fibers or chopped manufactured fibers—twisted (spun together)
- Varying surface textures depend on the fiber characteristics—examples:
 - cotton may be carded or combed (combing is an additional process making a smoother yarn & adding cost)
 - wool may be woolen or worsted (wool from short fibers, worsted from longer/smooth fibers—typically higher cost)

Filament:

- Continuous fiber from limited length (silk) to unlimited length (manufactured)
- Surface textures vary from very smooth to highly textured
- Monofilament (one filament) or multifilament (number of filaments varies)

Complex/Novelty:

- Complex—typically has several parts that contribute to the yarn's character
- Novelty—used in fabrics to add appearance/texture

Category: Spun Staple—expanded information

Simplified Staple Yarn Process for:

- Cotton fibers or any short (staple) fibers
- Including “blends”
 - “intimate” blend, example 50% cotton, 50% staple polyester—staple fibers spun together in one yarn

Basic Step One: Opening



Bales of cotton & polyester



Opening Process

Fibers in bales received in the plant were compacted for shipping. The bales are opened and the fibers “fluffed” in a process called “opening.”

Basic Step Two: Carding

Carding is the process to align the fibers after going through opening (fluffing). Fibers must be aligned in parallel positions to prepare for spinning. You may have seen someone hand-carding a batt of fibers at a craft fair—the old traditional method of carding. Commercial carding translates the manual process into industrial equipment that aligns fibers faster. The industrial carding machine (pictured next page) shows multiple card flats with fibers—as the machine rotates the fibers are aligned.



Hand-cards & fiber batt ready to card
Source: Wikipedista:Ryj, Public domain, via
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<https://commons.wikimedia.org/wiki/File:Rolag.jpg>



Commercial Carding Machine

Source: AlejandroLinaresGarcia, CC BY-SA 4.0

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Wikimedia Commons

<https://commons.wikimedia.org/wiki/File:FabricaSanPedro42.JPG>

Additional Optional Basic Step: Combing

Combing is an additional step that may be added to remove short and broken fibers, combing them out of the batt of fibers to produce a less fuzzy yarn. A label stating “combed cotton” on a product, for example sheets, indicates the combing process was added to produce a smooth strong yarn. Each additional step adds cost to the product. The smooth, soft hand of combed cotton demands a higher price.

Worsted wool yarns are combed, further aligning the fibers and removing short fibers leaving the longest fibers in the batt. A worsted yarn should be smooth, dense and strong. Be aware that some products made of synthetic fibers may be mislabeled as “worsted”—in commercial fabric production the term applies to wool yarns. However, the term “worsted yarn” is acceptable when used for medium weight hand knitting yarns. If you want more information on knitting yarn weights consult the Craft Yarn Council’s web site:

<https://www.craftyarnCouncil.com/standards/yarn-weight-system>

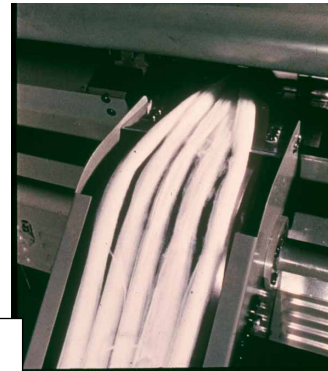
Basic Step Three: Gather fibers into roving (looks like a big yarn)



Wool roving for hand spinning

Source: Graciellou at English Wikipedia, Public domain, via Wikimedia Commons

<https://commons.wiki media.org/wiki/File:Greywoolroving.jpg>



Cotton roving machine
K. LaBat

The resulting batt of fibers that are somewhat aligned (parallel to each other) is processed to get closer to a yarn form. The batt is gathered into a “roving”—a long narrow bundle of fibers that has some twist to it. It looks like a big, fluffy yarn. In commercial production the roving goes on to further refinement—sometimes several steps to keep aligning and narrowing the “pre-yarn.”

<https://drkrinfabricprof.com>

Crafters sometimes use “roving” to “needle-punch” into an art piece. Wool roving can be “felted”—working the roving with moisture, heat and agitation to entangle the fibers.

Basic Step Four: Spinning

Spinning adds twist to the yarn. Amount of twist varies from slight to high/tight depending on the fiber and the end results wanted in the fabric. Twist contributes to texture and strength. Some common methods of commercial spinning are ring, rotor, and air-jet spinning. *YouTube* has many commercial spinning videos—search for “commercial yarn spinning.” Hand-spinning methods include drop-spindle and spinning wheel.



Hand spinning with spinning wheel
Source: Shieladixon, CC BY-SA 4.0
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<https://commons.wikimedia.org/wiki/File:LongExposureSpinningwheel.jpg>



Cotton-spinning machinery (1911) Originally from Encyclopedia Britannica, January 1911.
Source: AnonymousUnknown author, Public domain, via Wikimedia Commons
https://commons.wikimedia.org/wiki/File:EB1911_Cotton-spinning_Machinery_-_Fig._12._Jack-Frame_Room.jpg

Single yarns can be spun counter-clockwise (S twist) or clockwise (Z-twist). Z twist is more often used for commercial single-ply yarns. The differences are not of particular interest when purchasing fabric for home sewing or crafting projects. If you are a knitter or crocheter you might want to learn more about how twist direction can affect your projects and methods you use.



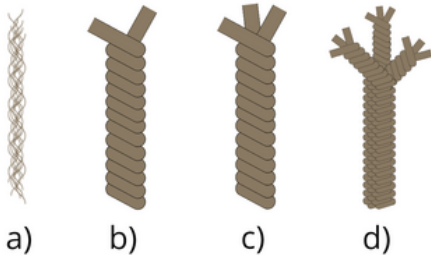
Yarn_twist.png: PKMderivative work: Dfred, Public domain, via Wikimedia Commons

https://commons.wikimedia.org/wiki/File:Yarn_twist_S-Left_Z-Right.png

Spun Yarn Ply Variations

A single yarn may be combined with other yarns—each yarn is called a “ply.” Typical ply types are: one-ply yarn, double ply yarn, 3 ply yarn and simple cord yarn. The simple-cord yarn combines plied yarns to make a thicker yarn. Cord yarns are often used in crafting projects—adding more texture and surface interest. In commercial production a 2-ply yarn combines a z-twist yarn and a s-twist yarn. The opposite directions help counterbalance each other.

Single, Ply and Cord yarns



Simple Yarns: a) simple one-ply yarn b) double ply yarn c) 3 ply yarn d.) simple cord yarn

Source: Paulo H. T. F. Alves, CC BY-SA 4.0

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[https://commons.wikimedia.org/wiki/File:Simple_Yarn_Construction._\(a\)_Simple_Ply_yarn,_\(b\)_Double_Ply_Yarn,_\(c\)_Three_Ply_Yarn_and_\(d\)_Simple_Cord_Yarn.png](https://commons.wikimedia.org/wiki/File:Simple_Yarn_Construction._(a)_Simple_Ply_yarn,_(b)_Double_Ply_Yarn,_(c)_Three_Ply_Yarn_and_(d)_Simple_Cord_Yarn.png)

Yarns Part 2 describes Filament yarns and Novelty/Complex Yarns