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Handspinning Designer Yarns.

In-Depth Study: 
Master Spinning Program 
Level 6, 
Olds College, Olds, AB

By Dora Mushka 
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Abstract:

Whether used to create a one of a kind garment or as an accent yarn, handspun designer yarns add design originality, texture and colour to hand woven or hand knit projects. The purpose of this study is to use texture and colour to design and produce handspun yarns in two ways. First by carding and combing fibres and second, by manipulating the fibers when spinning and plying. The study focuses on materials, the design process, analysis of designer yarns, and yarn characteristics as well as suggestions for end use.
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Introduction

In beginning this project, it was important to determine consistent definitions and methods for the yarns that would be sampled. According to Mabel Ross in *The Essentials of Yarn Design for the Handspinners.* (2001), “Whenever one starts to spin a yarn one is, in effect, ‘designing it’.” This statement is true in its most basic sense, however one must think about what is being done in the basic act of spinning yarn. In effect we are manipulating the fibres to produce a certain thickness and twist. In this study, yarn manipulation will refer to the process of spinning and plying yarn. As we spin we are determining the thickness and the amount of twist that will construct that yarn. These basics of controlling twist and grist as we attenuate the roving are the basics of yarn design by manipulation. When we ply we are again manipulating the yarn to our purpose. The amount of twist, the thickness or grist and plying direction are the basic manipulative techniques used in this study to add design elements such as colour and texture to yarn. The second technique is adding colour and texture through carding. With carding techniques, a variety of yarns can be created for any project simply by mixing colour, and adding textural and colourful elements to the roving or rolage. With these two techniques, the possibilities of creating unique designer yarns are endless and limited only by imagination.

The study was limited to discussing concepts for designing yarns and fibre projects, spinning, carding and plying techniques, materials descriptions, and end use of the yarns created. Background is given on the raw materials used. The study does not include dye methods and often commercially dyed and prepared roving was used. If the fibre was processed from the raw form, this was described in the yarn sample descriptions only in terms of how the yarn was impacted by the preparation. A brief history of spinning is included in the introduction to provide a contextual background to the creative process of making yarn in today’s world. It is a response to the question of “why we spin?”.

Names of the yarns* is consistent with the names given to designer and fancy yarns described in the *Master Spinners Course Material Levels 1 – 5* (Olds College, 2007) and *The Essentials of Yarn Design for Handspinners*, by Mabel Ross (2001); If there were other names, these were included in brackets beside the most commonly used term. Ross’ thickness measuring guide and twist angle guide were used for the measurement in all the yarn samples. Other information sources for this study include fibre and spinning related books and magazines, as well as experimentation and observation. Please refer to the references at the end of the report for a detailed listing.

*The exception to this is sample #14 Crinkle Yarn named by the author as this style of yarn was not found in the reference material.
Why do we Spin? A Brief History

For every species of animal, except human, food and shelter are the basic necessities of life. Humans however, require clothing and because of it, the creative means of making fabric. This dates back to the beginning of our existence. Initially humans wore the hides of other animals, but gradually, tufts of animal hair or plant fibre would be rolled down the thigh to create a viable thread which could then become fabric. Archeological evidence of string skirts dates back to the Paleolithic era 20,000 years ago. Almost as much as the need for clothing, human kind also has the need to create new and better ways of doing things. This desire to create dates back to the first crude spinning devices; stones with a length of twisted fibre wound around. It would put twist into the fibre as it whorled down and the fibre was attenuated upward. Later a stick was added as a place to store the yarn. It was the first spindle. Each refinement brought about a quicker more efficient evolution of yarn making. The spindle and distaff (a stick with a notch in the end of it to hold the raw fibre) were the main tools employed for many centuries by early nomadic humans to whom portability and productivity were important. The type of yarn made would depend upon the size and weight of the whorl, and the quality and type of fibre available.

Throughout civilized history, every family had the capacity to spin fibre and make clothing. The method of spinning however did not change until about 900 years ago after humans had settled into communities, along established trade routes and no longer needed to move to find food and goods. The earliest illustrations of spinning wheels are from Baghdad in 1237, China in 1270 and Europe in 1280. Evidence of spinning wheels in China and the Islamic world are also found in the 11th century. The first wheels were simply spindles mounted horizontally and attached by a band to a much larger wheel which was turned by hand. This allowed a greater variety of yarns to be produced, but required the spinner to turn the wheel with one hand, and, attenuate the fibres with the other. After putting twist into the yarn, the spinner had to stop and wind the yarn onto the spindle. In 1533 a treadle was added to allow the spinner to turn the wheel by foot. Leonardo da Vinci (c1500) drew a picture of a flyer that both twisted and wound the fibre, although actual production of this device is credited to a Brunswick woodcarver, Johann Jurgen who introduced the device to the Lower Saxony area in 1530.

The skill of early spinners is evident in many of the fabrics found in archaeological sites from the cradle of civilization to the Americas. Even in the Arctic, archologists have found spun fibres left by the Vikings that matched textiles woven in 13th Century Greenland. The Norse Chieftains are now thought to have come to Canada's northern shores to trade with early inhabitants, and the spun fibre from the Arctic hare would have been used for undergarments and baby blankets and thus a prized item of trade.

Most handspun yarns were single un-plied yarns. Any variation in softness, fineness, texture and colour came from the fibre itself or natural dyestuffs. Experienced spinners would produce tightly twisted worsted, single yarns for warp weaving and woollen style (fluffier yarns) for weft weaving. Two ply yarns were spun for knitting. The type of yarn produced depended upon how the fibre was prepared. Combs were used for laying flax and long stapled wool fibers into long straight alignment. These fibres were spun as worsteds, with high twist and little loft. They were used for close weaving of fine linens, tartans and later the Harris Tweeds of Scotland. Hand carders were used on short stapled wool to make loftier woollen style yarns used for weft or Fair Isle knits, stocking yarn and fine woollen lace yarns.

Housewives of the 1600's were encouraged to make threads to suit the use. A spinning instructor on the use of the great wheel “.....cautioned them to make their thread according to the nature of
the wool rather than their own desire, and he further commented that the English housewife made no diversity of spinning and "spins every thread alike, whilst the more experienced make two kinds of thread one for warp and one for weft" (Griersen, 1985, pgs. 12,13)

That is one view of the drudgery of spinning as a household chore, but there is plenty of evidence that our ancestors spun finely crafted fibres for ceremonial gowns and robes for royalty. They produced the finest of yarns for lace and the strongest for ropes and sails. They blended natural dyes into a vast array of colours, and they created yarns for knotted and woven tapestries, rugs and Navajo blankets.

In the 18th century, many household spinning wheels were set aside as the Industrial Revolution took hold. In 1764 James Hargreaves invented the spinning jenny, a multi-spool spinning wheel. This was improved upon by Samuel Crompton who combined the jenny and water frame to make the spinning mule. This produced a stronger thread and allowed mechanization of the process by Richard Arkwright who powered the spinning frame by a water wheel. This was the beginning of mass production of fabric and today we have open-end spinning or rotor spinning machines that produce yarn in excess of 40 meters per second. A wide variety of yarns are spun commercially, including multi-ply yarns and textured yarns that are blended both by colour and fibre type making them popular and convenient for knitters and weavers.

Mechanized yarn making changed hand spinning from the necessary household chore of clothing ourselves, to a hobby, a craft, and in some cases, an art form in the 20th Century. According to Alden Amos in the 1970's:

"...Hand spinning became both avant garde and popular. It presented just the right mix of back-to-nature commitment, rebellion, self-reliance and other swell qualities." He goes on to complain that: "At the close of the decade, a new direction was taken, involving vast amounts of strange yarn assembled under the aegis of Originality, Individuality, Creativity, and that giant-killer of criticism, Self-Expression. The Artiste, the Atelier, and peculiar yarn ruled supreme." (Amos, 2001, pg.12)

Amos goes on to say that in the 1980's hand spinners began to create "'real' yarn useful for knitting, weaving, crocheting, tatting, needlepoint..." and that "yesterday's hand spinner is likely to be today's weaver, knitter, needle worker, etcetera." (Amos, 2001, pg.12)

This evolution of hand spinning as a modern art form, backed up by proficiency and purpose is the subject of this study. The yarns and techniques presented apply the basics of yarn construction and a mastery of the various tools for making yarn obtained through the Master Spinners course of study. Those basic skills are applied to various colour combinations, fibres and techniques to produce unique yarns designed for specific purposes and characteristics.
Fibre selection.

The basic fibres selected for this in depth study include wool, llama, alpaca, and cotton. Silk, angora, cashmere and synthetic fibres, including commercial threads were used for blending and binding.

In selecting fibre one must first think about the end use of the yarn as well as the method of spinning. Will the yarn be woollen, worsted, and semi woollen or semi worsted? Will it be knitted, crocheted, woven or embroidered? If it is a garment, will it be worn close to the skin or as outerwear? If it is a wall hanging, rug or upholstery, strength may be more important than fineness. The characteristics of the fibre must be coordinated with the characteristics of the finished product. If not, no amount of spinning technique or finishing will make it right. It is one thing to select a fibre that is sound and pristine, but if it is not the right fibre for your project pass it by. Also think about your skill level; superfine merino wool may be easier for a beginner spinner to handle than a lock of alpaca fibre, yet it will produce a comparably good quality product.

Wool

The main things to consider in selecting wool is the breed of sheep and its characteristics as it relates to end use, the quality of the fibre and its preparation. Breeds of sheep are categorized into down breeds, long wool breeds and highland breeds.

**Wool from the down breeds** has a staple length of 2-5 inches. The staple is springy, short, fine diameter and downy. The fibres will have lots of crimp (11 to 35 crimps per inch). Wool from these breeds suit fine woven fabrics and soft woollen knitting yarns. They are used for baby garments, soft blankets or anything worn next to the skin. The crimp adds to the adhesion characteristic of the wool fibres. This makes them a good choice when adding elements such as bits of fabric, noils or garneting fibres, the felting characteristic holds onto these fibres more readily. Wool from the down breeds is a good choice for textured woollen style yarns. Generally wool from down breeds needs to be handled with care when carding and washing, as the fibres may tear, pill and felt. The breeds include Merino, Hampshire, Southdown, Dorset, Suffolk, and Rambouillet.

**Wool from the long wool breeds** is best for worsted preparations as they have a longer staple, less crimp and stronger fibres. The staple often looks more like a ringlet. Wool from these breeds is suitable for smooth strong yarns that produce long wearing outerwear sweaters, blankets and woven fabrics that are resistant to wear and pilling. The fibre will not felt as easily as the finer, downy breeds. Some long wool breeds include Lincoln, Leicester and Romney.

**Wool from the Highland breeds** has a long hairy fleece and is often double-coated with a kemp outer coat and a downy undercoat. The kemp hair is coarse, strong and durable making it suitable for rugs or outerwear. The undercoat is softer and makes excellent woollen sweaters and other outerwear garments. The wool is used in woollen or worsted preparations depending on which part of the fleece is used. Some Highland breeds are Karakul, Scottish Blackface and Rough Fell. Shetland is also a double-coated breed and when the two fibres are spun together a strong yet woollen yarn is produced to make the famous Shetland sweaters. The downy undercoat felts easily but the outer coat does not.

In selecting a wool fleece; the finer wool breeds such as Merino will feel greasier than the long hair or highland breeds. If it is Merino and it feels dry it is a warning sign. Look for a fleece
that is clean and free of debris, tags and discoloration. Check if the surface wool is matted or sun damaged. Check for weakness by selecting a lock and gently pull it between both hands. If it breaks the fibre is weak and damaged. Look at the crimp, the fineness and the lustre of the lock and determine if it is correct for the breed and the end use. If purchasing a complete fleece, lay it out on a tarp and separate the fibre from the legs, neck, back, sides, and shoulders. The shoulder area will provide the finest fleece, the sides the next best and the legs, back and neck the least desirable. Check for second cuts and remove them.

**Llama and Alpaca Fibre**

Llama and alpaca are hair fibres that vary in softness from very fine to coarse. The llama tends to be a double coated fibre with longer coarser guard hairs and a softer downy undercoat. These fibres are more slippery and tend not to hold onto one another. They are usually long fibres and can produce a strong fine thread that is warmer than wool. Alpacas are bred as fibre animals. The Huacaya alpaca has a dense woolly coat with some crimp in the fibre, while the Suri alpaca has long fibres that hang down like ringlets. The fibre is luxurious, silky and very fine. Huacaya is more common in Canada comprising 90 per cent of the total Canadian herd. The crimp gives the fibre memory and makes it more cohesive. It is suitable for fine felts as well as lustrous yarns while the Suri will produce beautiful and strong worsted yarns. Their fleeces are sheared and separated into the belly, neck and leg fibre. Each is a different grade with the belly being the finest grade, the neck the 2nd grade and leg fibre the least desirable.

Desirable qualities of llama and alpaca for hand spinners are:

- Colour ranges, There are up to 19 colours and blends (CanCam, 2000)
- Lustre and sheen
- Crimp is found in the Huacaya breeds. More crimps per inch allow a woollier yarn to be made while fewer crimps produce worsted yarns. Crimp also gives the yarn better memory and cohesion allowing a finer yarn to be spun with greater loft for hand knitting wollens.
- Staple length, (varies from 2 to 4 inches and longer) making it easier to match the staple length when blending with a variety of other fibres.
- Wearability; llama and alpaca fibre is very fine so is not suitable for socks or other hardwearing clothing unless it is blended with wool or nylon for strength.
- Warmth; cameld fibre differs from wool in cellular composition. The fibre is tubular with a hollow (medullated) core. This characteristic gives the fibre greater warmth to weight ratio than wool. It also sheds rain and snow. However, too much medullation increases the prickle factor or itchiness of a garment
- Tensile Strength. The cellular composition of the fibre also gives it strength when spun or woven. Historically the guard hair was spun and woven into lead ropes
- Hypoallergenic; llama and alpaca have no lanolin and can be worn by those who are allergic to wool products.
- Flame resistant.
- Inelastic; unlike wool, llama fibre has no memory and will not hold its shape. This is another reason for blending llama with wool especially for the hand spinner who is spinning yarn for knitting. It is not as critical for weaving. When properly spun it will yield a very fine beautiful worsted style yarn.
- Fineness (by micron count) Fineness is categorized by end use with 18 to 20 microns for fine garments worn close to the skin, 23 – 29 microns would be suitable for handknitting yarns while, over 30 microns is for outerwear and textiles. (*Llamas and Alpacas Coast to Coast*, April 2000, pp 23 –26)

**Selecting llama and alpaca fleeces:** check for debris and dirt in llama and alpaca fleeces. Dirt will wash out easily, but too much debris is more difficult to remove. Check for brittleness in the
fibre by holding a lock in both hands and gently pulling it lengthwise while holding it close to your ear. If it crackles the fibre is weak and weather damaged. (The fibre may feel soft to the touch and still be brittle.) Check the fleece for matting, discolouration uniform staple length and second cuts. It is important to match the staple length of the blending fibre if you plan to blend.

Some llama fibre is harvested by combing the soft down fibre out as it is shed by the animal. The guard hair does not shed. However, most llama fleeces available today are shorn and will have guard hair. Guard hair does not affect the quality of the fibre but it may need to be separated either by a specialty mill or by hand. Check for “eyelashes” in alpaca fleeces. These are short coarse curled locks of fibre found on the neck and legs and they are undesirable.

**Angora Fibre:**
Angora rabbits are bred for their fine downy coat of hair. Angora is an exotic fibre not just because it is so soft (micron counts of less than 13) but also because it “blooms” as it wears, giving garments a halo effect. It often takes only a small amount of angora to mix with wool, llama or alpaca to produce a halo effect. Also, like llama and alpaca, angora is a hair so it is inelastic and hollow making it very warm. When blended with wool, angora will give the wool a more luxurious feel and look, while the wool will lighten the angora and give it elastic qualities. Angora felts easily, it is warm but also light weight and water repellent. It has a tendency to pill so care must be taken in handling pure angora garments. The fibres are generally short stapled so it needs to be spun worsted with lots of twist. If blending with llama or alpaca, match the staple lengths to produce a well blended yarn that resists pilling and shedding.

**Selecting angora fibre:** when selecting angora determine the breed and whether the fibre has been plucked or sheared. Plucked (look for root ends on the fibre) is the best quality as it will be uniform. Sheared angora usually has shorter hairs that tend to pill. French and English angora rabbits produce the finest fibre but are the smallest of the breeds. Giant and Satin angoras are larger and produce more fibre, but it is usually sheared.

**Cashmere Fibre:**
Cashmere is the fine downy undercoat of the Cashmere goat that, when raised at 4500 meters in temperatures of -30C, in the Himalayan’s Kashmir Valley, produces some of finest and highest quality fibre. In these conditions, it is called Pashm and is used to make the highly priced and prized Pashmina shawls. Today China and Mongolia are the largest producers of cashmere, but any goat fibre that is less than 19 microns, crimped and non medullated (not hollow) is called cashmere. Some very good quality cashmere is available from local producers on the Canadian prairies where harsh winters provide the conditions necessary for good quality cashmere. Cashmere is fine, silky and luxuriously soft. The fibres are crimped allowing them to lock together making it easy to spin and giving the yarn elasticity. Cashmere is much warmer than wool - up to three times. It needs to be hand washed, but is easily dyed and absorbent.

Hand spinners can purchase cashmere fibre from local suppliers either as a raw fibre or processed into roving. Because it has a short staple it is usually spun fine and plied for bulk. It is used for both knitting and weaving. Cashmere fibre blends easily with wool, llama, alpaca and silk. The wool blends add loft to the yarn and make it more economical to use. The cashmere adds luxury while the wool adds wearability. It is wise to use high quality merino wool for blending. Llama and alpaca gain some elasticity from cashmere and make these fibres even more luxurious. Silk is also a common blending fibre adding strength, luxury and lightness to the cashmere.
Selecting cashmere fibre: Cashmere, like llama and alpaca needs to be dehaired. However, it is not as greasy as raw wool. Cashmere can come from any fibre producing goat. It is a term referring to the fineness, length and lustre of the fibre – not the goat breed. Cashmere must be 12 – 18 microns, crimped, non-medullated (not hollow) and low lustre. The staple must be 1 – 3 inches and the colour can be white, grey or shades of brown.

Silk
Silk, like wool, has been around for thousands of years. The Chinese developed Sericulture (silk moth cultivation) before 2500 B.C. A thousand years later, the Chinese had become very sophisticated in spinning and weaving silk, producing highly prized fabrics that were as light as air, lustrous and strong. In 125 BC, the Silk Road opened which was a 6000-mile caravan trek from China to the Mediterranean.

This highly lustrous, lightweight yet strong fibre is still considered one of the most luxurious. There are two types of silk: Bombyx silk is from the cultivated Bombyx mori moth. It has a white colour and fine texture. Wild silk is from the Tasar, Muga or Eri moths. It is called Tussah silk after the Tasar moth and is usually tan in colour and coarser textured.

About half of the silk processed is waste or schappe and this is mostly what is available to hand spinners. Silk comes as noil which is the short broken fibres left from the reeling process, roving, silk brick, silk bells, stacked hankies or mawata (in which the cocoon is opened up and spread out on a frame) or in the cocoon with the worm inside. In this study Sari silk is used in a flake yarn. It is the bits and pieces of fabric and thread left over from weaving the colourful Indian saris.

Silk has the rare characteristic of being both cool and warm because it is hydrosopic which means it absorbs moisture. By wicking moisture away from the body, silk garments feel cool in hot weather. However, because silk absorbs moisture it also has an insulating quality. One of the lightest weight fibres, silk is also elastic and strong in comparison to other fibres. These characteristics provide strength, drape and shape to a garment. Silk is easily dyed in any of its forms, and once dyed it is colourfast especially when using today’s chemical dyes. Silk hankies can be dyed in an array of colours producing a unique variegated yarn. Often the silk will take the dye differently than wool or other fibres. This gives an interesting effect when silk and wool, for example, are put in the same dye pot. Silk fibres are usually spun worsted and very fine. Put a silk single with other yarns, to add texture, colour and luxury.

Cotton
Cotton dates back to India about 3000 years ago and in Peru it dates back to 3000 B.C. It is produced in warm countries throughout the world, but Egypt’s Nile Valley continues to produce the fine, lustrous long stapled cotton that is prized by many. The fibre was introduced to North America by the Jamestown colonists as a commercial crop in the early 1600’s although the Anasaze, Puebloan, Hopi and other native groups of south western United States had been using cotton for 1400 years.

Characteristically cotton is cool in summer and versatile enough to make the finest of lace and the toughest of sails. Much of our summer clothing is made from cotton as it is cool, comfortable and affordable. It can be bleached, dyes easily, washes easily, absorbs moisture and will take on many finishes. Mercerization is one example in which the cotton threads are treated with sodium hydroxide to straighten and strengthen the yarn. Many of these yarns are ideal as core yarns for wrapped designer yarns. The fibres are very short so cotton is spun fine and plied for
thicker yarns. Longer stapled cottons such as Pima, Sea Island and Egyptian are easier to hand spin and are available from many suppliers. Cotton is usually white, but recent organic cotton growers are growing naturally coloured cottons in an array of colours from shades of brown (called coyote-coloured) to bronzes, greens and more recently mauves and peaches. These natural colours are intensified by washing or boiling.

**Setting (finishing) cotton** - To finish or set cotton, boil the skein in water and detergent for one hour, and dry it under tension. This removes most of the waxes and oils from the yarn allowing it to be dyed. If dying is not required, as with organic cottons, simmer on low heat for about one hour in water with a bit of mild detergent or washing soda. Remove the skeins and stretch them out by hand before hanging to dry. As they dry snap them against a hard surface to further relax the fibres. The colours of the organic cotton will intensify substantially with this method.

**Flax**
Flax is an extremely versatile fibre used for everything from making paper, rope or sails to the finest of linen lace, baby clothes and suits. It was cultivated in Babylon around 3000 BC where burial chambers depict flax being cultivated and made into clothing. Flax was also used for relief of stomach pains and was considered so important that Charlemange required its consumption by law (8th century). Locally flax was grown and processed by early Doukabour settlers whose hand spun and hand woven linen garments remain on display at Veregin House Museum in Saskatchewan.

Flax is spun from different forms including: strick – the long combed fibres, to flax top or tow; which is the short fibre left from the combing process. Flax fibres are twice as strong as cotton, stain resistant and wash easily. It can handle boiling water; it drapes well, is stain resistant and will not shrink. It is inelastic and has little resilience but is more resistant to damage from direct light than cotton. It is not easy to dye. Flax is damaged by mildew, heat, acids and sweat. It is resistant to moths and alkali. Flax fibre for spinning is available from specialty suppliers and the internet.

Flax is spun from a distaff with many different types and methods used. Top can be spun from your hand (a muff) if the fibres are wrapped in a damp towel. Flax needs a lot of twist and is always spun wet. Water is added to the spinning process by dipping your fingers in a bowl of water and smoothing down the length of yarn while spinning. This keeps the fibres from breaking and forms a stronger yarn.

**Setting Flax**: To finish flax yarns, boil the yarn in water with a little washing soda for one hour, refresh the water/washing soda and boil again to a maximum of three times. Dry the skein and slap it against a hard object to further relax and soften the fibres. The skein can also be steamed with an iron.

**Other Materials and Equipment**
**Materials included**: Nylon sparkle roving, feathers, glass beads and commercial threads available from yarn and sewing shops as well as spinning and weaving suppliers.

**Equipment and techniques**: Louet S51 for plying and thick woollen spinning, Louet Victoria for cotton and worsted spinning, Schacht wheel for both woollen and worsted spinning, and spindles for lace and singles spinning. Cotton hand cards were used for woollen and semi worsted blends of colors and inserting garnets or sparkle because it was easier to control the
amount of blending. The small hand combs were used for worsted blends. The drum carder was used for more thorough fibre blends.

Worsted and semi worsted, as well as woollen and semi woollen spinning methods were used depending upon the type of yarn being spun. The spinning method matched the carding method in most cases, however, in some of the samples this varied. Detailed descriptions of the spinning and carding techniques used in each yarn are given with the yarn samples. In some cases commercially prepared and dyed roving was used along with commercial yarns and threads as binding and core agents.

Designing Yarns with a Purpose

In a small project one may be able to get away with using up yarns that sit patiently awaiting their fate. But one risks not having enough, or the yarn is simply not suited to the project in mind. The colours may not quite go together, or the grist and twist do not match. The point of designing yarns is to create unique projects. The design process must extend beyond making the yarn to determining the how, what, when and where of the finished product. Many designer yarns are challenging and time consuming. Proper planning makes the time and effort worth while. There is great satisfaction in designing a project from start to finish; of making the myriad decisions required throughout the process and ending up with a finished product that not only serves its purpose, but is also a source of pride.

Experience and knowledge are cornerstones to beginning the design process, but these are achieved both by study and experimentation – by asking the question: What if? Then going ahead and giving it a try. The following is a planning guide for designing yarns and fibre projects.

Step 1: Imagination:

Imagine what your end project is and what characteristics/qualities it will have. If it is a sweater, will it be worn indoors or out; next to your skin or on top of other clothing? Does it need to be durable and hard wearing, or will it be delicate? Look at other sweaters and garments you own and decide what you like or don’t like about them; notice the handle, the size of the yarn and the colours. What colors do you like? Do you want your new garment to go with them or will it be something completely different. Use these same considerations if the project is to be used in your home, or as a gift. If the item is being designed for sale, consider your clientele, what colours and designs are fashionable and what has the widest appeal.

Step 2: Inspiration:

Inspiration comes from many places such as: scenic photographs from holidays; paintings and art pieces; the scene outside your window; fashion and art magazines and books; craft shows, yarn shops, museums and nature. Inspiration can also come from a yarn, a garment you’ve seen, or simply from the fibre itself. Make a practice of noticing the colours and textures from these sources and use them as inspiration for yarns. When looking at a scene, notice the colours, which stand out, contrast or accent. Is the landscape vertical, horizontal or undulating? What colours and textures can be put into the yarn to mimic the scene?

Step 3: Experimentation:

A) Fibre:

There are many options when making the decision about what fibre or combination of fibres to use. First determine if your garment will be knitted or woven, or spun worsted or woollen.
Blending fibres add colour and texture as well as, enhancing desirable characteristics or mitigating undesirable ones. For example, llama fibre and wool will give a knitted project memory and lightness, while still capturing the soft, silky handle of the llama. Silk and cashmere makes a luxurious blend while allowing contrast in colour and texture (sample 14) and angora blended with llama and a bit of sparkle provides an exotic yarn that is also hard wearing (sample 6). Bits of fibre in different colours can be blended in for a garneted look (sample 12) or commercial yarns, objects and rovings can be integrated into the fibre itself or added when plying yarns (samples 19 and 20). It is important to keep the characteristics of the project in mind when determining what blends to use.

B) Colour:
There are many methods of dying that produce various effects in yarns, however, the discussion of colour in this in-depth study is restricted to achieving colour effects by carding or spinning fibres that have already been dyed. When designing yarn with colour think about the season in which your garment will be worn, the mood you want to portray and whether you want the colors bright or muted, distinct or mixed up.

In basic colour theory, opposites on the colour wheel contrast, while colours on the same side of the wheel blend together. Red and green, yellow and purple, blue and orange are contrasting colours. But these colour combinations can be dramatically changed when saturation of color or value and hue are considered. Saturation or value refers to the deepness of the colour from dark to light. A grey scale helps determine a colour’s value. Hue refers to the under colour, for example orange red, yellow green, blue green, etc. Colours with similar hues will contrast less than colours with no hues in common. For example, pure red and pure blue have no hues in common and contrast more dramatically than if they both had a yellow hue. (Menz, 2005)

When blending colours by carding, the more you blend the more you mute the colours. For example in sample 2 blue and yellow are blended together to get a heathered green, but in the next two samples (3 and 4) these colours are spun both side by side and then separately and plied together for a more distinct, colour separation. In the first sample five colours are laid side by side in the roving, each colour is of similar value but have different hues and colours. The resulting yarn is a more muted and muddy than the bright colours in the roving would suggest.

Moods, seasons and colour: blues and violets are cool colours, while reds and yellows are warm. A cool blue is warmed up with a yellow hue, while a vibrant yellow is cooled down with a blue hue. Darker colours tend to be worn in cooler months, while lighter, brighter colours are preferred in summer. Muted colours suggest fall, while pastel colours are reminiscent of spring. If you are to wear the garment, determine what colours and hues look good on your skin type.

Colour and texture: In design, colour and texture have to be considered together. For example, a cabled stitch in an Aran sweater would not be a good choice for highly contrasted marl or heathered yarn. Sample 5b shows how a heathered yarn can diminish the cables to the point where they are barely noticeable. In this case a solid colour would allow the cables to stand out, while sample 5a demonstrates how a seed stitch enhances the heathered look.

Colour and texture can also be integrated into the project to provide a highlight or a contrast. For example a beaded yarn (sample 13) can enhance a lace border, while a similarly spun yarn without beads is used for the body of the project. In the same manner a feathered yarn (sample 20) is an interesting border on a hat where wear is not a concern.
C) Testing and Sampling

Making samples of the yarns by knitting or weaving swatches, measuring and finishing them, gives a representative sample of how the yarn will work for the planned project. Finishing means to wash, block and/or steam press the fabric. By doing this you can measure before and after to determine how much the fabric will shrink, abrade the surface to see how it holds up under hard wear, or set it in the sun for a few days to check colour fastness.

In this study, all samples are knitted even though some are more suitable as a weft or a warp in weaving. When considering weaving yarns, determine if the project is weft faced, warp faced or balanced. A weft faced weave will hide the warp and all your hand spinning. In a warp faced weave, the warp does all the work of adding colour and texture to the web. In a balanced weave the warp’s colour will either dull or brighten the weft colour or subdue texture. Highly textured and slub yarns are not suitable for warp as they weaken under the constant friction of the reed, but they can be excellent as weft.

In considering the number of plies, twist, and grist of knitting yarns, again the project leads the way. Knitted cables require large round yarns that allow the cable to stand out. These are usually multi plied yarns which are nicely rounded. Socks require firm yarns that hold up to hard wear and are usually three ply yarns that have a bit of nylon blended in. Lace yarns are delicate and light and can be spun and finished as singles*. Most default knitting and weaving yarns are two ply (MacKenzie McCuin, 2009).

Multi-plied yarns are used to achieve a smooth surface in knitting, such as for Aran and Guernsey patterns. Two ply yarns, especially those made with silky or shiny fibres such as, merino top, llama and alpaca tend to look uneven (sample 1,2,3), but will make a firm light web in weaving because the uneven edges of the yarn tend to lock together. Single or two-ply yarns make a less polished surface which works well in lace patterns. Three-ply worsted yarns are best for socks as they are strong, dense and smooth. However a, Navajo plied three ply yarn (sample 8) would not be suitable because the yarn wears more quickly at the small reverses in the yarn that are part of the plying method (MacKenzie McCuin, 2009).

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*A single can refer to one or more strands put together but twisted in the same direction while a plied yarn refers to two or more yarns twisted first in one direction then in another. (MacKenzie, McCuin, 2009, pg. 80)

Step 4: Organization.

A number of sources provide methods and calculations for determining how much fibre or yarn is needed for a given project. Mabel Ross offers a rough estimate of the amount in pounds and grams of yarn needed for a number of medium sized sweater types, in The Essentials of Yarn Design for Hand spinners (2001) but these are estimates only and are based on the weight of finished yarns.

Example:

To estimate how many yards of yarn you’ll needed for a sweater, select a sweater or a pattern and:

1) Knit a swatch 6 by 6 square inches (sq.in.) using the yarn, stitch and needle size, for the garment. Weight it then take it apart and measure the yards of yarn used to make it.

2) Determine the surface area of the sample garment or pattern.

Front length (20 in.) X Front width (18 in.) = 360 sq.in.
Sleeve length (18 in. X 16 in. of the sleeve width (measure sleeve width at the largest point) = 288 sq. in.
360 + 288 = 648 sq.in. X 2 (for the back and other sleeve) = 1296 sq.in.
1296 sq.in. / 36 sq.in of the sample) = 36 sample swatches to make the sample garment.

3) Determine yards of yarn required for the garment.
   36 X the number of yards of yarn to make the swatch = the length of yarn required.
   36 X the weight of the swatch = the weight of yarn required.

For a rough estimate of fibre weight, simply weight a sample garment that fits, but this is a rough idea only as wool weighs more than llama or cashmere and different blends will weigh more or less than others.

Complications also arise if you plan to start with a raw fleece as you need to allow for waste. To determine how much weight is lost in processing, take a predetermined amount of raw fibre (i.e.10 grams,) wash it, comb or card it and spin it, then weigh it again. The difference between the original weight and the finished yarn weight is the loss in processing. If it is 20 percent, add 20 percent to the amount of fibre you’ll need.

To calculate yardage for weaving determine the width and length of the yardage you’ll make, plus a predetermined additional amount for shrinkage. To determine the percentage the web will shrink in finishing, weave a sample, measure, wash and finish it then re-measure the sample. Determine the amount of shrinkage in percentage terms and add that to yardage calculations.

**Example:**
The web will be woven at 20 ends per inch (epi.); 24 inches wide, and 5 yards long (including 1 yard for loom waste) (or 5 X 36" = 180" in.) plus 10% for shrinkage.

20 epi. X 24 in. wide X 180 in. long = 86,400 inches + 10% shrinkage or 8640 additional inches = 95,040 total inches / 36 inches in a yard = 2,640 yards of yarn.

If the weave is balanced and the weft is similar in size (wraps per inch or wpi) to the warp, the number of yards needed for the weft is roughly the same as for the warp (minus the 1 yard wasted in tying the warp to the loom). As a rule of thumb, weavers simply double the warp to determine yardage for the weft. However, if you hand spin the weft yarn, you may want a more accurate measure of the amount you’ll need. In this case sampling is necessary to determine the number of picks per inch in the weft. Multiply this amount by the finished width and length of the fabric as for the warp.

**Example:**
20 picks per in. X 24 in. wide X 144 in. long (144 in. is the total finished length of the fabric.) = 69,120 in. + 10% (6912 in.) = 76,032 in. / 36 in. in a yard = 2,112 yards of fibre for the weft.

**Step 5: Implementation:**
Sourcing resources can be challenging. Begin by making a detailed list of materials needed to complete the project. Include fibre type and amount as well as any other materials, equipment, time and skills required. If time is a factor, source fibres that are already processed and/or dyed to save the time and effort of scouring, cleaning, carding and dying your own fibre. Small specialty mills provide fibre processing, blending and dyeing services, or can provide processed, blended and dyed rovings for sale. Spinning, weaving and yarn retailers are good sources for equipment and materials. Many are available via the internet or mail order. Skills can be self taught through books or learned with others in fibre related courses and guilds. If cost is a factor,
purchasing raw fibres may be more cost effective. Be ready to compromise if not all the resources are available.

In selecting fleeces to purchase, get to know a trusted supplier. In most cases it is advisable to physically check a fleece before purchasing it. Commercially prepared roving is of sufficiently consistent quality that it can be purchased by mail with confidence.

**Finishing:** Will you finish the yarn or wait and finish the completed project? In knitting, many designer yarns are over twisted and need to be washed and hung to dry, or even steamed to create a yarn balanced enough for knitting and weaving. If the yarn is to be used in a woven fabric, you may want to finish it only enough to relax the twist so that you get the full effect of wet finishing and fulling the fibre.

**Making Designer Yarns**
Note: Please refer to the appendices for samples and more detailed descriptions of the yarns discussed below.

**A) Coloured Effects by Manipulation and Carding:**

The first set of yarns and knitted samples demonstrate some of the colour effects achieved by carding and by manipulating coloured rovings. Carding means that colour effects have been achieved by hand carding or combing colours together. The degree of blending produced different results. Manipulation refers to methods by which coloured rovings were attenuated and fed into the twist or ply.

To keep colours crisp and separate in the yarn, they must be kept separate in the spinning as in marl yarns. To keep colours crisp and separate in the fabric, they must be kept separate in both the spinning and the plying (Navajo plys and the yarns from coloured rolags).

To achieve muted or blended colours, the coloured fibre was blended before it was spun. This was done by light carding for heathered yarns, and by laying the colours side by side in the roving then attenuating and feeding each colour into the twist at about the same time for mottled yarns.

Heathered type yarns are made up of different coloured roving or rolags spun or carded together to mix up the colours. The first sample of a heathered yarn was created by spinning a commercially prepared roving made up of different colours. The resulting yarn shows how the value of the colours changes by mixing them together in the spinning process. Each colour was distinct in the roving, but when they were spun together, they created a muted yarn that comes out much browner that the roving would suggest. The variation in the colours was two fold: first was a general heathered look, and second, blocks of colour dominate in different areas.

In Samples 2, 3 and 4, the same rovings (blue and yellow) were used in the same proportion for three different colour effects. It is interesting to note that even though the three yarns were made from the same colours, they don't compliment each other.

In sample 2, blue and yellow wool tops were combed together until a relatively homogeneous colour of green was achieved. Equal amounts of each colour were lashed onto one of the hand combs alternatively. (One layer of blue, one layer of yellow until the comb was full). The other
Gigging comb was moved through the lashed on fibre in a side to side motion, catching just the ends of the secured lock each time until all the fibre was transferred to the other comb except for the short ends left in the lashed comb, which were removed. Then the combs were exchanged and the process repeated until a uniform colour was achieved. The wool was removed from the comb with a diz by placing a small amount of fibre through the hole in the diz and gently pulling it through, moving the diz back toward the comb and across the front of the tines. The fibre was then spun worsted with a fairly tight twist.

Marl yarn (sample 3) sometimes referred to as Ragg yarn used two colored wool tops of yellow and blue spun separately then plied together so that the colours produced a barber pole effect. The colours remained distinct with no green hue evident.

Mottled yarn (sample 4) used the same two coloured wool tops of yellow and blue laid side by side and attenuated together. Each color was spun as it appeared. In some areas the yellow dominated and in others the blue did. Where they mixed, a marled effect was produced. Because the colours are allowed to mix a bit more than in sample three, the mixing produces a green hue in some areas of the sample.

Samples 5a and 5b show mottled yarns of three colours. White, grey and black llama rovings were placed in the same dye bath using Gaywool lilac. The three rovings were then attenuated and spun together to create a mottled effect. This sample demonstrates the effect of two knitting stitches used on a mottled or heathered yarn. In sample 5a the cables in the knitting were virtually lost. While they may have stood out better if multi-ply yarn was used, one can still see how the colours subdued the pattern. In sample 5b however, the colour effect was heightened with a moss stitch, giving texture as well as colour interest to the yarn.

Sample 6 is a type of heathered yarn using elements, besides coloured roving for a more subtle colour and texture. In this yarn a small amount of nylon metallic sparkle roving and angora was carded with llama roving. Each fibre was weighed in the proportion they were to be blended, laid on the hand carders and blended. The roving was taken off semi worsted (rolled up from left to right) and attenuated for spinning in a worsted style.

The sparkle was very subtle in this yarn as was the angora. Because the colours of the angora and the llama were matched, the effect of the angora was more pronounced in the texture of the yarn than the colour. The metallic sparkle nylon added colour and light to the yarn giving it a luxurious effect without affecting the handle (metallic sparkle nylon tends to be prickly if too much is used.)

Sample 7, was inspired by a photograph of the Grand Canyon. Colours for the yarn were selected to match the colours in the photo. In addition, the layered look of the photo, (blocks of solid colours and areas of mottled colour) required a method of carding and spinning to mimic that layered effect. To achieve this, each of the three colours was weighted out into small (approximately one gram) amounts and placed into separate piles. The rovings were then spun one after the other onto two bobbins, being careful to begin and end both bobbins with the same colour. The two yarns were plied together creating areas of solid colour and areas with a marled effect.

Navajo plying is a technique to put colour blocks into yarn and fabric as it keeps colours separate. It also creates a three ply yarn from one single. Each colour in this yarn was spun in the same rotation. The Navajo ply was done by tying a large loop (12 – 14 in.) to the lead then pulling the yarn coming from the spool up through the loop to create another loop – in a similar
manner to finger crochet. An even tension, consistent feed and treadle control was important to producing a smooth yarn.

A small knot is left in the yarn each time it is looped. This cannot be avoided, but it can be minimized by keeping even tension in the plying and by using a smooth worsted style single. The knitted sample demonstrates the smoother surface produced by a three ply yarn.

An organic cotton in the Fall Medley colour pallet was selected for this cable yarn (sample 9). Because of the short staple length cotton is spun fine. Thicker cotton yarns are achieved by plying. That made cotton a good candidate for this cable yarn. To make the yarn, two, two ply yarns were spun ZZS at approximately one and a half times the single twist. Then the two plied yarns were plied Z to create a strong thick cotton cable yarn with interesting colour variation. The yarn was finished by simmering in a solution of washing soda (one teaspoon of washing soda to one litre of water) to darkened the colours.

The second cable yarn (sample 10) was created to demonstrate the knit characteristics of cable yarns. Four plies created a very strong yarn that was more even and rounder than a two ply. In knitting, this characteristic produced more defined stitches, a bulkier fabric and a nice wooly handle. The yarn could be used for outdoor wear, such as Aran or Gernsey sweaters.

On the opposite scale is the lace cashmere single yarn (sample 11). The light highlights were made by tying the skein tightly in a number of places and dyeing it. The cashmere was spun from a lock using a light weight spindle. The singles were highly energized, but set after the dyeing and finishing process. Other methods of introducing colour variation in singles yarns would be to use a roving or silk hankie that has been dyed different colours. The lace yarn would be suitable for lace knitting, or for knitting lace sheer (lace yarns knit on larger needles as in the sample), or as a core or binding yarn in wrapped style yarns.

B) Textured Effects by Manipulation and Carding

Textured yarns are designed for both visual interest and contrast. In some cases practicality takes a back seat to design, but highly textured yarns in the correct context add beauty and contrast to a project. Making textured designer yarns by manipulation means that textured elements were put into the yarn during the plying process (flake yarns) Textured yarns by carding means these elements were carded into the fibre before spinning (garneted yarns). The next series of yarns also made full use of colour variation, however, texture was the main element considered in their design. Choosing the right fibre and the elements to be put into the fibre are important considerations for textured yarns. They were more challenging to make because they required changing the direction of the ply, manipulating ply to insert elements, manipulating twist direction, controlling and varying twist, and varying grist.

Twist Direction: Often textured yarns require a commercially available yarn for a core yarn or a binding yarn. To determine the direction of twist in these yarns lay the yarn flat. If the twist angles to the right like a back slash (\) it is S plied, if it angles to the left (/) it is Z twist. In some yarns one is required to ply in the same direction as the existing twist, and in some cases extra twist is added so one can ply in the opposite direction to the plied twist.

This garneted yarn (sample 12) required a fibre with good felting characteristics so the bits of wool would bind into the yarn as it was being spun. A superfine merino fleece was selected, scoured. One quarter inch long pieces of coloured wool yarn were carded into the fleece in a
woollen preparation. The yarn was spun woollen and plied. It was finished by washing vigorously in hot soapy water to further felt the wool bits into the yarn. In a woollen preparation, the fibres were more likely to swirl around and grab the bits of yarn. Garneting produced a subtle colour effect in the yarn that showed up best in a stocking stitch. It would also produce an attractive tweed effect in woven fabric.

Inspired by a winter sunrise and the Christmas lights on our house, this beaded yarn (sample 13) made use of colour, texture and technique. One, two-ply yarn was made with llama and the variegated thread. The thread was given additional Z twist before it was plied with the llama single then the two ply was given additional S twist. A second two ply yarn was made by stringing glass beads onto the cotton thread and then plying it with the llama single. Additional S twist was given this yarn as well. Then the two yarns were plied together Z to create a strong cable yarn that securely fixed the glass beads. A Louet wheel was used, because it had a large orifice to accommodate the beads. Most beaded yarns are described as three ply yarns in which the beads are strung onto a thread which is then fed into the ply of to other yarns. This cable created a sturdier beaded yarn that was still fine enough to use as a lacy trim.

In the knitted samples, the beads tended to hang out in the back of the stocking stitch and had to be forced through to the front. This was less noticeable in the garter stitch. Placement of the glass beads was also a consideration. Although they were fairly evenly spaced in the yarn, they tended to bunch up in the sample size. Determining the width of the knitting would help to more evenly space the beads in the knitting and weaving. For example by spacing the beads 6 to 8 inches apart in the yarn, they would tend to gather at the row ends of a 6 to 8 inch wide knitted or woven fabric such as a scarf.

Random spacing produced more random placement of the beads in the fabric. Also because some of the beads appear in the front of the knitting and some in the back, a garment that shows both sides such as a knitted or woven scarf would work well with this yarn.

This crinkle* yarn (sample 14) was a happy surprise in the finishing. It made use of the different characteristics in the fibres to create texture and colour. First silk and cashmere take dye differently so even though both were dyed the same colour, the silk is lighter. Second, silk has low elasticity, while cashmere is more elastic, therefore when they were plied together, washed and air dried in a relaxed state, the cashmere curled up and wrapped around the silk creating a beautifully textured yarn with a soft luxurious handle for sheer or lace knitting.

Llama fibre also reacts this way if it is not completely dehaired. The downy fibres in the undercoat will wrap around the inelastic coarser guard hair to create a looped effect in the yarn. It can be frustrating effect if not wanted, but it is alleviated by drying and/or steaming the yarn under tension.

The three-ply wrapped yarn or Kese yarn (sample 15) required three elements, a core thread, a binding thread and a wrapping yarn. Each was considered in the design which was inspired by a winter scene of the sun rising over the garden. First the core thread was spun Z worsted at 20 wraps per inch (wpi.) and a lot of twist. The wrapping yarn was spun Z woollen, with thick and thin areas and less twist at approximately 8 wpi. These two singles were plied together S. The core yarn was held under tension with the wrapping yarn held lightly at a 45 degree angle to the core yarn and allowed to wrap around the core. The binding yarn was given additional S twist before being plied Z with the wrapped yarn. The yarn was both textured and colourful, with the colours from the silk noil and metallic nylon reminiscent of sparkling hoar frost and pink sunrises. The thick and thin fluffy snow texture was also evident in the yarn and knitted sample. The yarn would suit a knitted and fulled winter hat.

This Kese yarn (sample 16) is entirely different, in that it is hard and rough. The technique for this yarn was taken from *The Intentional Spinner: A Holistic Approach to Making Yarn*, by Judith MacKenzie McCuin (2009). Traditionally it was made of tightly twisted silk or linen. This one is made of superfine flax top around a crochet cotton core. The cotton core was a commercial yarn plied Z. The flax top was spun S with high twist from a damp muff. The two threads were plied together Z in the same direction as the core, so that core would bind into the wrapping thread. The core thread was held straight while the flax thread was allowed to knot up, wrap and loop around it. The resulting yarn was highly twisted and textured. It was finished by boiling in water and washing soda. The yarn was then laid flat to dry and steamed with an iron to relax the twist and soften the fibres. The sample was knit with the desired effect of being a rough loofah like fabric.

This wrapped yarn (sample 17) was inspired by an article in *Spin Off* (Spring 2008) using a different technique than was described in the article. A woolly felting fibre was selected for the wrapping yarn, while a 2/8 weaving cotton (plied S) was used for the core. The wrapping fibre was spun Z with low twist but thick for maximum coverage. The two yarns were plied together S with the core being allowed to feed directly into the orifice while the wrapping yarn was held at the 45 degree angle. At 4 – 5 inch intervals the wrapping yarn was pushed up the core yarn to make a firm corkscrew. The yarn was finished by vigorous washing in hot soapy water to bind the wrapping fibres together around the core. The yarn would make an interesting contrasting element to a more conventional yarn in a knitted scarf or an accent warp in a weaving project.

A spiral yarn (sample 18) is made by plying two singles of different grist together. It is classified as a wrapped yarn but has the barber pole effect of a marl yarn. In this sample a thick woolly yarn was spun woollen with low twist at an average of 10 wpi. A second yarn was used both for an accent colour and texture. It was spun at 25 wpi. from a silk hankie on a spindle. The singles were plied S with the thicker yarn held at a 45 degree angle from the silk single. A spiral yarn gives added structure and strength to a lightly twisted woollen style single, as well as providing an opportunity to add colour and texture. It is loose and woolly for wefts and bulky knits.

Flake yarns (sample 18) are textured by inserting pieces of fabric or wool pieces into the ply. Two equally twisted singles were created, then while they were plied together, pieces of sari silk were inserted into the ply. The threads and bits of fabric are very colourful. In this case they were cut into smaller one inch pieces before being inserted into the ply. A woollen style yarn was used to further bind the fibres during washing. The yarn was washed in hot, soapy water and rinsed in cold to further felt the fibres together. This is a highly textured yarn, suitable for a bulky knit garment or as an accent on a bulky knit.
Using the same basic principles as for a flake yarn this feathered yarn (sample 20) was created with a nod to Franchesca (llama photo). It resulted in an impractical, pretty unstable, flighty yarn which fits perfectly with Franchesca’s temperament! The yarn was constructed with two singles spun Z. The feathers were inserted into the ply as for the flake yarn above. The ply was over-plied S similar to a cable yarn. A third thin (25 wpi.) silk thread was then spun S and plied Z with the feathered ply. White silk was selected because of the white in Franchesca’s neck and face. The yarn was washed in hot soapy water with some care so the feathers could bind to the fibre as it felted up. Even so, the feathers fall out fairly easily. This yarn would accent a knitted and felted hat. The feathered yarn could be woven into the band and the felting process in the hat would further stabilize the feathers. It was difficult to knit with this yarn because the feathers would bind up in the stitches. The feathers faired well in the washing and fluffed up nicely when they dried.

The final sample (21) is a knotted yarn. Two singles were spun Z worsted at similar grist and twist. Using the pink single as the core, the green single was held at a 45 degree angle and allowed to run down the core for about 6 to 8 inches before being stopped and allowed to go back and forth over the same area, forming a knot. The yarn was then washed in hot soapy water and laid flat to dry. In a knitted application, the knots didn’t tend to pull through the stitch to the right side of the fabric. Rather, holes were left giving an eyelet lace effect. The knots came out better in the garter stitch but again produced an eyelet effect. On the card sample where the yarn lays flat, the texture is more pleasing and would look interesting as a weft in a weft faced weave, but would probably be lost in a balanced weave structure. The knots appear on both sides of the fabric and would work well in such applications. It would not be suitable for a warp as the knots would wear in the reed.

**Conclusions:**

- Highly textured yarns are better suited to accents than to making over all garments because the elements are often more fragile, have less wearability or are too wild to be practical in a full garment. (sample 20)
- Textured yarns made by manipulation require a thorough knowledge of twist angle, twist direction and how twist reacts as it is being added (plied into the twist) or subtracted (plied opposite to the twist) from the yarn.
- Count, wraps per inch, twists per inch etc, are not accurate measures of many textured yarns. The weight of inserted elements is inaccurate in relation to the length, while the twist and grist is deliberately varied. These yarns are more accurately described by using the grist and twist in the singles before plying such as for beaded and flaked yarns.
- Most textured yarns are more suitable for weft than for warp in weaving. This is because they are more woollen style yarns with slubs, variable twist and elements such as beads, knots and flakes that would not move through the heddles or the reeds without breaking.
- Colours become muted the more they are mixed. The colour intensity of a roving will not necessarily translate into the yarn or the fabric as in the first sample.
- The same coloured roving produces dramatically different results simply by changing the spinning technique as seem in samples 2, 3 and 4.
- The type of fibre used has a bearing on the success of designer yarns. For example woollen type fibres are more suitable for textured yarns that have to bind to other fibres and added elements (garneted yarns), while worsted style preparations work well for coloured effects because they are easier to card and attenuate together (sample 1).
• Consideration needs to be given to each fibre element, how it is handled on its own and how that affects the yarn and finished garment or fabric. While one can take an educated guess, sampling and experimentation are the best ways to determine how well a yarn will work (Crinkle Yarn sample 14, Kese yarn, sample 16,).

• When inserting textural elements such as beads, knots, flakes etc into the yarn, random works best. Evenly inserted elements can, depending upon the size of the stitch, length of the row and size of the knitting needles, cause these elements to bunch together or congregate in odd locations such as the side of the fabric. Often they look most pleasing when allowed to appear at random in the fabric. These elements will appear on both sides of the fabric so they work best in double sided applications (samples 13 and 21).

• Experimentation and sampling are the best tools in designing yarns as in sample (14), and the wrapped yarn in sample (17). Even though books and magazines provide instruction on the basics of making designer yarns, they are just a starting point to combining techniques, blending colours and manipulating fibres to create interesting yarns.

• Each time an element such as a second or third strand of yarn is added, it is an opportunity to add colour or texture to the finished yarn.
References:


Web Sites and Articles:


_____ . Llamas and Alpacas Coast to Coast, April 2000, (pp.23 –26)


In Depth Study: Appendices
Yarn Samples

Handspinning Designer Yarns.

Master Spinning Program
Olds College, Olds Ab.

By Dora Mushka
2009
Yarn Samples Appendices:

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- Sample 3: Marl yarn (Ragg yarn)
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Colour Effects by manipulation and carding:

The following yarns and knitted samples demonstrate some of the colour effects achieved by carding and by manipulating coloured rovings. Carding means that colour effects have been achieved by hand carding or combing colours together. The degree of blending produced different results. Manipulation refers to methods by which coloured rovings were attenuated and fed into the twist or ply.

To keep colours crisp and separate in the yarn, they must be kept separate in the spinning as in marl yarns. To keep colours crisp and separate in the fabric, they must be kept separate in both the spinning and the plying (Navajo plies and the yarns from coloured rolags).

To achieve muted or blended colours, the coloured fibre was blended before it was spun. This was done by light carding for heathered yarns, and by laying the colours side by side in the roving then attenuating and feeding each colour into the twist at about the same time for mottled yarns.
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Sample 1: Heathered Yarn

This heathered yarn was created by spinning a commercially prepared roving made up of different colours. In this yarn, pink, orange, blue, gold and green were laid side by side in a single roving. The resulting yarn shows how the value of the colours changes by mixing them together in the spinning process. Each colour was distinct in the roving, but when they were spun together, they created a muted yarn that comes out much browner than the roving would suggest.

The yarn stands out in stocking knit, moss stitch or garter knit. The variation in the colours was two fold: first was a general heathered look, and second, blocks of colour (pink, orange or green) dominate in different areas. This yarn is suitable for an indoor garment like a knitted sweater, a vest or for stockings if spun as a three ply yarn. The yarn would also be suitable as warp in a balanced or warp faced weaving.

Fibre content: wool roving (commercially prepared)  
(proportions of colour unknown)  
Carding method: worsted  
Spinning method: worsted  
Twist direction: ZZS  
Angle of twist: 33 degrees.  
Grist: 12 wpi  
Count: 4 worsted  
Tpi: 5
Sample 1: Heathered Yarn (multi-colours)

#1 Heathered Yarn
Fibre: wool roving
(commercially prepared)
(proportions of colour unknown)
Carding: worsted
Spinning: worsted
Twist direction: ZZS
Angle of twist: 33
Grist: 12 wpi
Count: 4 worsted
Tpi: 5
Heathered Yarns:

In Samples 2, 3, 4, the same rovings (blue and yellow) were used in the same proportion for three different colour effects. It is interesting to note that even though the three yarns were made from the same colours, they don’t compliment each other. Worsted yarns produce smooth surfaces in either knitted or woven fabrics. The wool is hard wearing so these yarns are suitable for indoor garments such as sweaters or vests, or scarves, gloves and mittens.

Sample 2: Heathered Yarn
In this sample two colors of wool top (yellow and blue) were combed together until a relatively homogeneous colour of green was achieved. Equal amounts of each colour were lashed onto one of the hand combs alternatively. (one layer of blue, one layer of yellow until the comb was full) Using the other comb as the jigging comb, I moved it through the lashed on fibre in a side to side motion, catching just the ends of the secured lock each time. I continued until all the fibre was transferred to the other comb except for the short ends left in the lashed comb, which I removed. Then I exchanged combs and repeated the combing until the fibres were well blended. I removed the wool from the comb with a diz by placing a small amount of fibre through the hole in the diz and gently pulling it through, moving the diz back toward the comb and across the front of the tines. The fibre was then spun worsted with a fairly tight twist.

Fibre content: wool top (commercially prepared, blue and yellow)
50% yellow and 50% blue
Carding method: worsted
Spinning method: worsted
Twist direction: ZZS
Angle of twist: 27 degrees.
Grist: 12 wpi
Count: 4.8 worsted
Tpi: 6
Sample 2: Heathered Yarn (two-colour)

#2: Heathered Yam
Fibre: wool top
(commercially prepared, blue and yellow)
50% yellow, 50% blue
Carding: worsted
Spinning: worsted
Twist direction: ZZS
Angle of twist: 27
Grist: 12 wpi.
Count: 4.8 worsted
Tpi: 6
Sample 3: Marl Yarn (Ragg Yarn)

In this sample two colored wool tops of yellow and blue were spun separately then plied together so that the colours produced a barber pole effect. The colours remained distinct with no green hue evident. The yarn would make an interesting warp, weft or knitted project.

Fibre content: wool top (commercially prepared, blue and yellow)
50% yellow and 50% blue
Carding method: worsted
Spinning method: worsted
Twist direction: ZZS
Angle of twist: 30 degrees.
Grist: 12 wpi.
Count: 3 worsted
Tpi: 7 1/2
Sample 3: Marl Yarn (Ragg Yarn)

#3 Marl (Ragg) Yarn
Fibre: wool top
(commercially prepared,
blue and yellow)
50% yellow and 50% blue
Carding: worsted
Spinning: worsted
Twist direction: ZZS
Angle of twist: 30
Grist: 12 wpi.
Count: 3 worsted
Tpi: 7 1/2
Sample 4: Mottled Yarn

In this sample the two coloured wool tops of yellow and blue were laid side by side and attenuated together. Each color was spun as it appeared. In some areas the yellow dominated and in others the blue did. Where they mixed, a marled effect was produced. Because the colours are allowed to mix a bit more than in sample three, the mixing produces a green hue in some areas of the sample. This yarn was not as tightly spun as the previous sample, and would be a suitable weft or produce and interesting all over effect in a knitted garment.

**Fibre content:** wool top (commercially prepared, blue and yellow)
50% yellow and 50% blue

**Carding method:** worsted

**Spinning method:** worsted

**Twist direction:** ZZS

**Angle of twist:** 27 degrees.

**Grist:** 12 wpi

**Count:** 3.6 worsted

**Tpi:** 6 – 6 1/2
# 4: Mottled Yarn
Fibre content: wool top (commercially prepared, blue and yellow)
50% yellow and 50% blue
Carding: worsted
Spinning: worsted
Twist direction: ZZS
Angle of twist: 27
Grist: 12 wpi.
Count: 3 6 worsted
Tpi: 6 - 6 1/2
Samples: 5a and 5b Mottled Yarn (using three coloured rovings).

In this sample, white, grey and black llama rovings were placed in the same dye bath (gaywool lilac). The three rovings were then attenuated and spun together to create a mottled effect. This sample demonstrated the effect of two knitting stitches used on a mottled or heathered yarn. In sample 5a the cables in the knitting were virtually lost. They may have stood out better if multi-ply yarn was used, one can still see how the colours subdued the pattern. In sample 5b however, the colour effect was heightened with a moss stitch, giving texture as well as colour interest to the yarn.

Fibre content: llama roving (white, grey and black dyed using gaywool lilac)
Carding method: semi-woollen
Spinning method: semi-woollen
Twist direction: ZZS
Angle of twist: 14 degrees.
Grist: 8 wpi
Count: 6 woollen
Tpi: 3
Samples 5A and 5B: Mottled Yarn (three-coloured rovings).

Sample 5A

Sample 5B
Sample 6: Sparkle Yarn

In this yarn a small amount of nylon metallic sparkle roving and angora was carded with Llama roving. The carding method used was to measure out the weights of each fibre in the proportion in which they were to be blended. A very thin layer of llama was placed onto the face of one hand card, then a thin layer of angora, then llama then nylon metallic sparkle, llama, angora and llama to get the approximate proportion. This was lightly carded until well blended. The roving was taken off semi worsted (rolled up from left to right) and attenuated for spinning in a worsted style.

The sparkle was very subtle in this yarn as is the angora. Because the colours of the angora and the llama were matched, the effect of the angora was more pronounced in the bloom and handle of the yarn than the colour. The metallic sparkle nylon added colour and light to the yarn giving it a luxurious effect without affecting the handle (metallic sparkle nylon tended to be prickly and harsh if too much was added) The yarn could be used for an indoor garment such as a sweater or vest, or a lacy scarf or shawl.

**Fibre content:** light grey llama 75%, light grey angora 23%, metallic sparkle nylon 2%
**Carding method:** semi worsted
**Spinning method:** worsted
**Twist direction:** ZZS
**Angle of twist:** 21 degrees.
**Grist:** 14 wpi.
**Count:** 8.1 worsted
**Tpi:** 7
Sample 6: Sparkle Yarn

Fibre: light grey llama 75%, light grey angora 23%, metallic sparkle nylon 2%
Carding: semi worsted
Spinning: worsted
Twist direction: ZZS
Angle of twist: 21
Grist: 14 wpi.
Count: 8.1 worsted
Tpi: 7
Sample 7: Yarn designed from colored Rolags

This yarn was inspired by a photograph of the Grand Canyon. Colors for the yarn were selected to match the colors in the photo. In addition, the layered look of the photo, (blocks of solid colour and areas of mottled colour) required a method of carding and spinning to mimic that layered effect. To achieve this, each of the three colours was weighed and placed into piles containing about 1 gm of each colour. The roving was then spun one colour after the other onto two bobbins, being careful to begin and end both bobbins with the same colours. The two yarns were plied together creating areas of solid colour and areas with a marled effect.

**Fibre content:** wool top (commercially dyed in turquoise, orange and green)
**Carding method:** woollen
**Spinning method:** semi woollen
**Twist direction:** ZZS

**Angle of twist:** 21 degrees.
**Grist:** 14 wpi
**Count:** 13.7 woollen
**Tpi:** 5 - 6
Sample 7: Yarn designed from colored Rolags

#7 Yarn designed from coloured Rolags
Fibre: wool top
(commercially dyed in turquoise, orange and green)
Carding: woollen
Spinning: semi woollen
Twist direction: ZZS
Angle of twist: 21
Grist: 14 wpi.
Count: 13.7 woollen
Tpi: 5 - 6
**Sample 8: Navajo ply**

Navajo plying is used to keep colours separate, and to create a three ply yarn from one single. However, a small knot is left in the yarn each time it is looped. This cannot be avoided, but it can be minimized by keeping even tension in the plying and by using a smooth worsted style single. The knitted sample demonstrates the smoother surface produced by a three ply yarn. The yarns are suitable for knitting or weaving, but are not recommended as sock yarns because the knots tend to wear and cause discomfort.

Each colour in this yarn was spun in the same rotation, i.e. natural, pink and green. This yarn was spun worsted at approximately 25 wraps per inch (wpi) in the single. The Navajo ply was done by tying a large loop (2 – 14 inches) to the lead then pulling the yarn as it came from the supply bobbin up through the loop to create another loop – in a similar manner to finger crochet. A smooth yarn is produced by keeping an even tension, consistently feeding the yarn and maintaining a slow steady treadle.

**Fibre content:** wool top and silk commercial top  
( pink, green and natural )  
**Carding method:** worsted  
**Spinning method:** worsted  
**Twist direction:** ZZZS  
**Angle of twist:** 33 degrees.  
**Grist:** 12 wpi.  
**Count:** 7.4 worsted  
**Tpi:** 3
Sample 8: Navajo ply

#8 Navajo Ply
Fibre: wool top and silk commercial top
(pink, green and natural)
Carding: worsted
Spinning: worsted
Twist direction: ZZSZ
Angle of twist: 33
Grist: 12 wpi.
Count: 7.4 worsted
Tpi: 3
Sample 9: Cable Yarn - Cotton

An organic cotton was selected for this cable yarn because of the short staple length and the colour variations in the roving. Cotton has a very short staple. It needs to be spun fine single (25 wpi) in a woollen method with lots of twist. Thicker cotton yarns are achieved by plying. This made cotton a good candidate for this cable yarn. To make the yarn, two, two-ply yarns were spun ZZS. These were plied S at approximately 1 ½ times the single twist. Then the two ply yarns were plied Z to create a strong thick cotton cable yarn with interesting colour variation. The yarn was finished by simmering in a solution of washing soda (one teaspoon washing soda to one litre of water). This also darkened the colours.

The yarn was sampled for using in a crocheted grocery bag.

**Fibre content:** Domestic Organic cotton (fall medley)
**Carding method:** roving (semi woollen)
**Spinning method:** woollen
**Twist direction:** ZZS, ZZS, SSZ
**Angle of twist:** 14 degrees.
**Grist:** 10 wpi
**Count:** 3 cotton
**Tpi:** 6
Sample 9: Cable Yarn - Cotton

# 9: Cable Yarn - Cotton
Fibre: Domestic Organic cotton (fall medley)
Carding: roving (semi woollen)
Spinning: woollen
Twist direction: ZZS, ZZS, SSZ
Angle of twist: 14
Grist: 10 wpi
Count: 3 cotton
Tpi: 6
Sample 10: Cable Yarn - Wool

This sample was created to demonstrate the knit characteristics of a cable yarn. Four plies created a very strong yarn that was more even and rounder than a two ply. In knitting, this characteristic produced more defined stitches, a bulkier fabric and a nice wooly handle. The yarn could be used for outdoor wear, such as Aran or Gernsey sweaters.

**Fibre content:** wool top (commercial)  
**Carding method:** roving (semi worsted)  
**Spinning method:** semi worsted  
**Twist direction:** ZZS, ZZS, SSZ  
**Angle of twist:** 21 degrees.  
**Grist:** 8 wpi  
**Count:** 3.2 worsted  
**Tpi:** 5
Sample 10: Cable Yarn - Wool

Fibre: wool top (commercial)
Carding: roving (semi worsted)
Spinning: semi worsted
Twist direction: ZZS, ZZS, SSZ
Angle of twist: 21
Grist: 8 wpi.
Count: 3.2 worsted
Tpi: 5
Sample 11: Lace Single

Color variation was introduced into this lace cashmere single yarn by tying the skein tightly in a number of places and dying it. This made a dark yarn with lighter highlights. The cashmere was spun from a lock using a light weight spindle. The singles were then skeined and tied in 8 places as they were highly twisted Z. This secured the yarn preventing it from becoming a tangled mess, and produced a tie dyed effect. Other methods of introducing colour variation in singles yarns would be to use a roving or silk hankie that has been dyed different colours.

This lace yarn would be suitable for lace or lace sheer (lace yarns knit on larger needles as in the sample), or as a core or binding yarn in wrapped style yarns and boucles.

**Fibre content:** Cashmere (domestic)
**Carding method:** woollen
**Spinning method:** woollen (spindle)
**Twist direction:** Z
**Angle of twist:** 33 degrees
**Grist:** 25 wpi.
**Count:** 15 woollen
**Tpi:** 10-12
Sample 11: Lace Yarn (single)

# 11: Lace Single
Fibre: Cashmere (domestic)
Carding: woollen
Spinning: woollen (spindle)
Twist direction: Z
Angle of twist: 33
Grist: 25 wpi.
Count: 15 woollen
Tpi: 10-12
Textured yarns by manipulation and by carding

Textured yarns are designed for both visual interest and contrast. In some cases practicality takes a back seat to design, but highly textured yarns in the correct context add beauty and contrast to a project. Making textured designer yarns by manipulation means that textured elements were put into the yarn during the plying process (flake yarns) Textured yarns by carding means that elements were carded into the fibre before spinning (garneted yarns). The next series of yarns also made full use of colour variation, however, texture was the main element considered in their design.

While the coloured yarns emphasize color over fibre, textured yarns are the opposite. Choosing the right fibre and the elements to be put into the fibre were the most important planning aspects of these textured yarns. They were also more challenging to make because they required: changing the direction of the ply; manipulating ply to insert elements; a thorough working knowledge of twist direction; control of twist, and making variations in grist.

Twist Direction: Often textured yarns require a commercially available yarn for a core yarn or a binding yarn. To determine the direction of twist in these yarns lay the yarn flat. If the twist angles to the right like a back slash (\) it is S plied, if it angles to the left (/) it is Z plied. In some yarns one is required to ply in the same direction as the existing twist, and in some cases extra twist is added so one can ply in the opposite direction to the plied twist.
Sample 12: Garneted Yarn (Tweed yarns)

This garneted yarn required a fibre with good felting characteristics so the bits of wool would bind into the yarn as it was being spun. First different coloured wool yarn was cut into small pieces about ¼ inch long or smaller. Then a small amount of scoured wool was placed onto the hand cards. Layered onto that was a sprinkling of the yarn bits (about 1 teaspoon). Then another small amount of wool was added on top and the whole was lightly carded until the bits of wool were well distributed. The batting was rolled into a rolag (horizontally to the face of the hand card) ensuring a woollen preparation. This was spun woollen and plied. The yarn was finished by washing vigorously in hot soapy water to further felt the wool bits into the yarn. In a woollen preparation, the fibres were more likely to swirl around and grab the bits of yarn. Garneting produced a subtle colour effect in the yarn that showed up best in a stocking stitch. It would also produce an attractive tweed woven fabric if used in the weft.

Fibre content: superfine merino wool, scoured. Wool yarn cut into small ¼ inch pieces.
Carding method: woollen
Spinning method: woollen
Twist direction: ZZS
Angle of twist: 14 degrees
Grist: 8 wpi
Count: 3.9 woollen
Tpi: 4
Sample 12: Garneted Yarn (Tweed yarns)

# 12 Garneted Yarn (Tweed)
Fibre: superfine merino wool, scoured. Wool yarn cut into small ¼ inch pieces.
Carding: woollen
Spinning: woollen
Twist direction: ZZS
Angle of twist: 14
Grist: 8 wpi
Count: 3.9 woollen
Tpi: 4
Sample 13: Beaded Yarn

Inspired by a winter sunrise and the Christmas lights on our house, this beaded yarn made use of colour, texture and technique. One two ply yarn was made with llama and the variegated thread. The thread was given additional Z twist before it was plied with the llama single then the two ply was given additional S twist. A second two ply yarn was made by stringing glass beads onto the cotton thread and then plying it with the llama single. Additional S twist was given this yarn as well. Then the two yarns were plied together Z to create a strong cable yarn that securely fixed the glass beads. A Louet wheel was used, because it had a large orifice to accommodate the beads. Most beaded yarns are described as three ply yarns in which the beads are strung onto a thread which is then fed into the ply of to other yarns. This cable created a sturdier beaded yarn that was still fine enough to use as a lacy trim.

The yarn was steam set and then knitted into samples. The beads tended to hang out in the back of the stocking stitch and had to be forced through to the front. This was less noticeable in the garter stitch. Placement of the glass beads was also a consideration. Although they were fairly evenly spaced in the yarn, they tended to bunch up in the sample size. Determining the width of the knitting would help to more evenly space the beads in the knitting. For example by spacing the beads 6 to 8 inches apart in the yarn, they would tend to gather at the row ends of a 6 to 8 inch wide knitted or woven fabric such as a scarf.

Random spacing may produce more random placement of the beads in the knitting or weaving. Also because some of the beads appear in the front of the knitting and some in the back, a garment that shows both sides such as a knitted or woven scarf would work well with this yarn. It would work especially well as a trim or accent.

**Fibre content:** black llama roving, commercial thread, glass beads  
**Carding method:** semi worsted  
**Spinning method:** semi woollen  
**Twist direction:** SSZ  
**Angle of twist:** 14 degrees  
**Grist:** 16 wpi  
**Count:** 7.8 woollen  
**Tpi:** 5
Sample 10 Beaded Yarn

Fibre: black llama roving, commercial thread, glass beads
Carding: semi worsted
Spinning: semi woollen
Twist direction: SSZ
Angle of twist: 14
Grist: 16 wpi
Count: 7.8 woollen
Tpi: 5
Sample 14: Crinkle yarn

This easy crinkle style yarn was discovered by accident. It made use of the different characteristics in the fibres to create texture and colour. First silk and cashmere take dye differently so even though both were dyed the same colour the silk is lighter. Second, silk has low elasticity, while cashmere is more elastic, therefore when they were plied together, washed and air dried in a relaxed state, the cashmere curled up and wrapped around the silk creating a beautifully texture yarn with a soft luxurious handle for sheer or lace knitting.

Llama fibres that has not be dehaired will react this way in that the downy fibres in the undercoat will wrap around the inelastic coarser guard hair to create a looped effect in the yarn. A frustrating effect if not wanted. It is fixed by drying and/or steaming the yarn under tension to set it.

**Fibre content:** Cashmere and silk (50%/50%)
**Carding method:** Cashmere woollen, Silk hankies
**Spinning method:** semi woollen,
**Twist direction:** ZZS
**Angle of twist:** 14 degrees
**Grist:** 16 wpi
**Count:** 16.8 woollen
**Tpi:** 7 1/2 - 8
Sample 14 Crinkle Yarn

#14 Crinkle Yarn Fibre:
Cashmere and silk (50%/50%)
Carding: Cashmere woollen. Silk hankies
Spinning: semi woollen
Twist direction: ZZS
Angle of twist: 14
Grist: 16 wpi
Count: 16.8 woollen
Tpi: 7 1/2 - 8
Sample 15: Wrapped three-ply

The three-ply wrapped yarn required three elements, a core thread, a binding thread and a wrapping yarn. Each was considered in the design which was inspired by a winter scene of the sun rising over our garden. First the core thread was spun Z worsted with at 20 wpi and a high degree of twist. The wrapping yarn was spun Z woollen, with thick and thin areas and less twist at approximately 8 wpi. These two singles were plied together S. The core yarn was held under tension with the wrapping yarn held lightly at a 45 degree angle to the core yarn and allowed to wrap around the core. The binding yarn was given additional S twist before being plied Z with the wrapped yarn. It makes a brick a brack effect. The yarn was both textured and colourful, with the colours from the silk noil and metallic nylon reminiscent of sparkling hoar frost and pink sunrises. The thick and thin fluffy snow texture was also evident in the yarn and knitted sample. The yarn would suit a knitted and fulled winter hat.

Fibre content: core and wrapping yarns: wool/cashmere/silk noil and metallic nylon roving blended in 60%, 35%, 5% proportions. Binding thread, sparkle quilting thread.
Carding method: woollen
Spinning method: core yarn; worsted at 20 wpi.
Wrapping yarn; woollen
Twist direction: ZZ, S, Z
Angle of twist: 20 degrees
Grist: 8 wpi
Count: 7.5 woollen
Tpi: approx 3
# 15: Wrapped three-ply.
Fibre: wool/cashmere/silk
roll and metallic nylon
roving blended in 60%,
35%, 5% proportions.
Metallic quilting thread.
Carding: woollen
Spinning: core yam;
worsted at 20 wpi.
Wrapping yam: woollen
Twist: ZZS, S, Z
Angle of twist: 20
Grist: 8 wpi
Count: 7.5 woollen
Tpi: approx. 3
Sample 16: Kese yarn

This Kese yarn used fibre and manipulation to produce textural elements suitable for a kese, which is a washing cloth that works somewhat like a loofah. The technique for this yarn was taken from *The Intentional Spinner: A Holistic Approach to Making Yarn*, by Judith MacKenzie McCuin (2009). Traditionally it was made of tightly twisted silk or linen. This one is made of superfine flax top around a crochet cotton core. The cotton core was a commercial yarn plied Z. The flax top was spun S with high twist from a damp towel. The two threads were plied together Z in the same direction as the core, so that core would bind into the wrapping thread. The core thread was held straight while the flax thread was allowed to knot up, wrap and loop around it. The resulting yarn was highly twisted and textured. It was finished by boiling in water and washing soda for about 1 hour. The yarn was then laid flat to dry and steamed with an iron to relax the twist and soften the fibres. The sample was knit with the desired effect of being a rough loofah like fabric.

- **Fibre content**: superfine flax top, crochet cotton
- **Carding method**: worsted
- **Spinning method**: worsted
- **Twist direction**: Z, S, Z
- **Angle of twist**: 30 – 40 degrees
- **Grist**: 14 wpi
- **Count**: 8.3 linen count (same as woollen)
Sample 16 Kese Yarn (flax)

#16 Kese Yarn
Fibre: superfine flax top, crochet cotton
Carding: worsted
Spinning: worsted
Twist direction: Z, S, Z
Angle of twist: 30 – 40
Grist: 14 wpi
Count: 8.3 linen count
Sample 17: Wrapped (corkscrew yarn)

This wrapped yarn was inspired by an article in Spin off (Fall 2008) but a different technique was used. A woolly felting fibre was selected for the wrapping yarn, while a 2/8 weaving cotton (plied S) was used for the core. The wrapping fibre was spun Z with low twist but thick for maximum coverage. The two yarns were plied together S with the core being allowed to feed directly into the orifice while the wrapping yarn was held at the 45 degree angle. At 4 – 5 inch intervals the wrapping yarn was pushed up the core yarn to make a firm corkscrew. The yarn was finished by vigorous washing in hot soapy water to bind the wrapping fibres together around the core. The yarn would make an interesting contrasting element to a more conventional yarn in a knitted scarf or an accent warp in a weaving project.

**Fibre content:** wool/cashmere/silk noil (60%, 35%, 5%)
2/8 weaving cotton
**Carding method:** woollen
**Spinning method:** woollen
**Twist direction:** SZS
**Angle of twist:** 45-50 degrees
**Grist:** 8 -10 wpi.
**Count:** 3 woollen
**Tpi:** 10
Sample 17: Wrapped (corkscrew yarn)

#17: Wrapped (cork screw yarn)
Fibre: Wool, cashmere, silk
niol (60% 35% 5%)
2/8 weaving cotton
Carding: woollen
Spinning: woollen
Twist direction: S2S
Angle of twist: 45-50
Grist: 8-10 wpi.
Count: 3 woollen
Tpi: 10
Sample 18: Spiral Yarn

A spiral yarn is made by plying two singles of different grist together. One is very thin, the other can be thick or thick and thin as in this sample. It is classified as a wrapped yarn but has the barber pole effect of a marl yarn. In this sample a thick woolly yarn was spun woollen in a thick and thin style with low twist at an average of 10 wpi. A second yarn was use both for an accent colour and texture. It was spun at 25 wpi. from a silk hankie on a spindle. The singles were plied S with the thick and thin yarn held at a 40-45 degree angle from the silk single. A spiral yarn gives added structure and strength to a lightly twisted woollen style single, as well as providing an opportunity to add colour and texture. It is loose and woolly for wefts and bulky knits.

**Fibre content:** Alpaca/Shetland/ silk noil (60%, 35%, 5%)
Silk hankie

**Carding method:** woollen, silk hankie
**Spinning method:** woollen, worsted
**Twist direction:** ZZS
**Angle of twist:** 14 degrees
**Grist:** 10 wpi
**Count:** 5.5 woollen
**Tpi:** 4-6
Sample 18: Spiral

#18 Spiral Yarn
Fibre: Alpaca/Shetland/silk noil (60%, 35%, 5%)
Silk hankie
Carding: woollen, silk hankie
Spinning: woollen, worsted
Twist direction: ZZS
Angle of twist: 14 Grist: 10 wpi
Count: 5.5 woollen
Tpi: 4-6
Sample 19: Flake Yarns

The texture in this yarn was created by manipulation. Two equally twisted singles were created, then, as they were being plied, pieces of sari silk were inserted into the ply. The sari silk, available from yarn shops, is the leftovers from the mills that weave Indian saris. The threads and bits of fabric are very colourful. In this case they were cut into about one inch pieces before being inserted into the ply. A woollen style yarn was used to further bind the fibres during washing. The yarn was washed in hot, soapy water and rinsed in cold to further felt the fibres together. This is a highly textured yarn, suitable for a bulky knit garment or as an accent on a bulky knit.

**Fibre content:** Alpaca/Shetland/silk noil (60%, 35%, 5%)
Sari Silk cut into approximately one inch pieces.
**Carding method:** woollen
**Spinning method:** woollen
**Twist direction:** ZZS
**Angle of twist:** 30 degrees
**Grist:** 8 wpi.
**Count:** 2.9 woollen
#19: Flake Yarns
Fibre content: Alpaca / Shetland / silk noil (60%, 35%, 5%)
Sari Silk cut into approximately one inch pieces.
Carding: woollen
Spinning: woollen
Twist direction: ZZS
Angle of twist: 30
Grist: 8 wpi.
Count: 2.9 woollen
Sample 20: Feathered Yarns

Using the same basic principles as for a flake yarn this feathered yarn was created with a nod to our llama Franchesca. It resulted in an impractical, pretty unstable, flighty yarn which fits perfectly with Franchesca’s temperament! The yarn was constructed with two singles spun Z. The feathers were inserted into the ply as for the flake yarn above. The ply was over plied S similar to a cable yarn. A third thin (25 wpi) silk thread was then spun S and plied Z with the feathered ply. White silk was selected because of the white in Franchesca’s neck and face. The yarn was washed in hot soapy water with some care so the feathers could bind to the fibre as it felted up. Even so, the feathers fall out fairly easily. This yarn would accent a knitted and felted hat. The feathered yarn could be woven into the band and the felting process in the hat would further stabilize the feathers. It was difficult to knit with this yarn because the feathers would bind up in the stitches. The feathers fairied well in the washing and fluffed up nicely when they dried.

Fibre content: Llama, wool, silk (65%, 30%, 5%)
Feathers, silk bombyx roving.
Carding method: woollen
Spinning method: woollen
Twist direction: ZZS, S, Z
Angle of twist: 21 degrees
Grist: 12 wpi.
Count: 8.2 woollen
Sample 20: Feathered Yarn

#20, Feathered Yarn
Fibre: Llama, wool, silk (65%, 30%, 5%)
Feathers, silk bombyx roving.
Carding: woollen
Spinning: woollen
Twist direction: ZZS, S, Z
Angle of twist: 21
Grist: 12 wpi.
Count: 8.2 woollen

#20 Silk Single binding yarn
Fibre: Silk
Carding: silk brick
Spinning: woollen
Twist direction: S
Angle of twist: 27
Grist: 25 wpi.
Count: 4 Denier
Sample 21: Knotted Yarn

This knotted yarn produced an interesting effect in the knitted fabric. It would also create interesting texture in a weft. Two singles were spun Z worsted at similar grist and twist. Using the pink single as the core, the green single was held at a 45 degree angle and allowed to run down the core for about 6 to 8” before being stopped and allowed to go back and forth over the same area until a knot was formed. The yarn was then washed in hot soapy water to set the twist and laid flat to dry. In a knitted application, the knots didn’t tend to pull through the stitch to the right side of the fabric. Rather holes were left giving an eyelet lace effect. The knots came out better in the garter stitch but again produced an eyelet effect. On the card sample where the yarn is laid flat, the texture is more pleasing and would look interesting as a weft in a weft faced weave. It would probably be lost in a balanced weave. It would not be suitable for a warp as the knots would wear in the reed.

Fibre content: commercial merino wool silk blend top (80%, 20%)
Carding method: worsted
Spinning method: worsted
Twist direction: ZZS
Angle of twist: 27 degrees
Grist: 14 wpi
Count: 4 worsted.
Sample 21: Knotted Yarn.

#21 Knotted Yarn
Fibre: commercial merino wool silk blend top (80%, 20%)
Carding: worsted
Spinning: worsted
Twist direction: ZZS
Angle of twist: 27
Grist: 14 wpi
Count: 4 worsted.