

Understanding and Interpreting Fundamental Basic Weave Structures for Fabric Production

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Abstract

Plain weave, twill weave, and satin weave are the basic weave structures produced in practically every country in the world. Textiles and fashion have evolved from small enterprises to international corporations. However, practical knowledge of plain weave fundamental structures, which are employed to make 80% of the bulk of these textiles required in the textile and fashion industries, is not easily recorded for proper understanding in many of Nigeria's tertiary institutions and cottage industries. However, fashion trends show that understanding and incorporating plain weaves or designs into end-user styles using the two shafts loom will expose art practitioners to the skillful use of these weave structures, evolve limitless design options, and generate replacement materials for textile and fashion designers. Experimental and descriptive research approaches will be used with the requisite literacy resources. The purpose of this study is to explain the structures and analysis of basic weave structures. The essence is to create a platform for the appreciation of this weave structure as well as its viability as an entrepreneurial opportunity in the cottage and fashion industries.

Keyword: *Basic structure, Plain Weave, Entrepreneurial, Trend, Loom*

Background to the Study

The rich and diverse worlds of woven textiles may be traced back to millennia of decorative and intricate attires that various cultures are famed for, revealing the breadth and range of aesthetic consciousness in African woven textiles. Weaving traditions were generational in most cultures, and the materials produced were fashioned according to status. As a result, woven fabrics were utilized for different social classes as well as for cultural identity and documentation. Hamam (2013) describes weaving as the textile art of interlacing two sets of strands termed the warp and weft at the right angle to make a fabric or cloth. On a woven cloth, the warp yarns run vertically, while the weft yarns run

<http://internationalpolicybrief.org/journals/science-publishing-corporation-journals/edu-science-journal-vol5-no3>

horizontally. All fabrics are woven on either manual or mechanical loom equipment where the warp yarns are stationed and the weft yarns interlace from selvedge to selvedge

Woven fabrics are produced in a wide range of pattern alternatives throughout cultures worldwide. Various mechanisms enable different designs and effects to be realized. The structure of the cloth is determined by how the warp threads are interlaced or woven together. Weaving traditions, materials, and techniques, motifs, and content have evolved over the ages, and each woven cloth is identified with a specific geographical area of the country. Yoruba weavers, for example, produce *Aso-ofi* cloths, *Tiv* weavers produce *Angeh* and *Tugudu* cloths, Hausa weavers produce *Rigagiwa* and *Yankuri* cloths, and Igbo weavers produce *Akwa-ocha* and *Akwete* cloths. These African textiles are distinctive in both appearance and texture. They are also ingrained in the diversity of African cultures, as well as in people's practice within their daily African societal situations.

However, when commercially woven fabrics were introduced to Africa, the use of woven cloth fell dramatically in some societies because imported fabrics embrace comprehensive weave structures and utilize a wider range of compatible materials and advanced technology. The impact of these on conventional woven textiles led to weaving modification and the experimentation of new design variations to meet consumers' insatiable needs (Picton & Mack, 1989). However, some remarkable developments have emerged in this weaving tradition. By introducing color changes, adding textures, varying thread size, fiber and twist, and blending warps and wefts, infinite design possibilities are created.

Many contemporary African designers have realized the value of embracing their cultural history and using African traditional and indigenous textiles in their designs. Hand-woven designs in African textiles are being brought into current fashion design daily as a result of these advancements. This vogue can be found in interior design and fashion magazines. African woven fashions have affected Christian Dior and Ralph Lauren collections, while Zaire raffia garments have inspired European painters like Paul Klee and Henri Matisse (Clarke, 2004: 31). Furthermore, well-known fashion firms in Africa, Europe, and the United States are combining traditional woven textiles into fashionable styles. In addition, the Komole collection was showcased at Mercedes-Benz Fashion Week Africa and in South Africa for a rave display (Sagoe, 2012).

She says, "The *Komole* is our brand's innovation. Nigerian fashion designers started by creating separates in Western styles, and now, our aesthetic has grown immensely. Having regard to this fascination, there is a need for further design options available to the weaver. These basic plain weave structures would offer infinite design possibilities to many art practitioners in the small and medium-scale textile industries.

Method

This study uses the experimental research method to produce five distinct plain weave basic structures with two-shaft loom equipment and the descriptive research method to explain the different weave drafts: color warp order, warping plan, weft color order, and the designs on the models to gain a better understanding of weave structure. It is a universal fact that fabrics have always provided a means of transmitting the most subtle and complex of messages through woven fibers. As a result, the following subheadings were created: color variation technique, warp color order, basic weave structure, presentation of basic weave experiments, weaving procedure, and conclusion toward proper knowledge and interpretation of basic weave structures for fabric production.

Theoretical Framework

This study is theoretically relevant in the following ways: It will make many basic structure drafts available for proper comprehension and appreciation. It will act as a reference point and documentation procedure for small and medium-scale textile industries as they experiment and explore new possibilities. It will acknowledge the importance of simple weave structure not only in fabric production but also in improving the aesthetics of sown garments.

Conceptual Literature

This study is conceptually relevant because it will improve and boost weaving techniques among art practitioners. Inspire the establishment of small and medium-scale enterprises toward entrepreneurial practice, and spark artistic renaissances since cultural elements have a profound influence on how individuals express themselves, even as artists demonstrate how profoundly creativity is connected to the cultural context in their creations.

Colour Variation Technique

This involves technical innovation unique to multi-coloured warp backgrounds with alternating multi-coloured weft insertion. After the weave plan, the colour variation is achieved when yarns of the same size and colour are introduced in the warp colour order and the weft colour order/lifting plan.

A Weave Plan: A weave plan is used to express the written information of a fabric structure. It is advisable to complete the total number of repeats for each bracket before proceeding. In the draft below, the weave plans enclose 1 warp and each is repeated 4 times. Contemporary: despite the multiplicity of weaves that are possible on modern looms, plain weave comprises a very large portion of all woven fabrics.

Fig. 1: Comprehensive Draft for Plain Weave

2		2		2		2		2		2		1		2
	1		1		1		1		1		1		1	
													/	
													/	
													/	

Source: Ajiginni Margaret (2013)

Rules for the Weave Plan

1. Each small square on a design paper represents a point of interlacing.
2. When the warp is over (above) the weft, the small square in the design paper is painted black.
3. When the weft is over the warp, the small square in the design paper is left blank

Warp Colour Order: This shows the placement of colour for each warp end in the threading draft. It matches the threading draft, left side matching left side. Individual colours are listed at the left side. For example, warp colour order of 1/1 and 2/2 basic weave (yellow and black) will be warped below as:

Fig. 2

1/1 Warp Colour Order (1 black & 1yellow)

Acrylicwool Black55Tex	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acrylicwool Orange55Tex	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

2/2 Warp Colour Order (2 black & 2 yellow)

Acrylicwool Black 55Tex	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Acrylic wool Orange55Tex	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Source: Ajiginni, Margaret (2013)

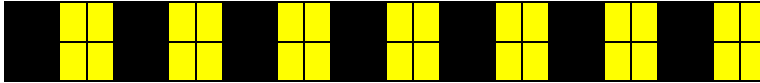
Warping Plan: The warping process is the order in which warp threads are arranged through the heald's eye and the dents of the reed. The smallest number of ends in colour or count that repeat across the fabric is the warp repeat. The warping order is from left to right, standing at the front of the loom.

Fig. 3

1/1 Weave Plan



2/2 Weave Plan



Source: Ajiginni Margaret (2013)

Weft Colour Order: The weft colour order is occasionally written like the warp colour order, but usually the colours are shown in the treading sequence by a letter corresponding to a colour.

Fig. 4

1/1 Weft Colour Order

Acrylic wool Black 55Tex	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acrylic wool Orange 55 Tex	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

2/2 Weft Colour Order

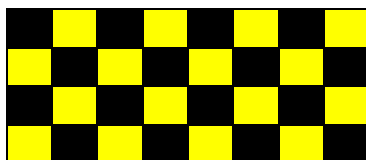
Acrylic wool Black 55 Tex	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Acrylic wool Orange 55 Tex	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Source: Ajiginni Margaret (2013)

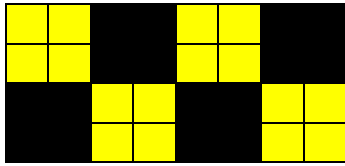
Lifting Plan: This indicates the order of lifting the shaft on successive picks in order to produce the pattern. The order in which the weft are inserted into the warp is referred to as the weft or picking plan. The smallest number of picks in colour or count that repeats across the fabric is the weft repeat. The picking order is given from bottom to top, standing at the front of the loom.

Fig. 5

1/1 Weft Lifting Plan



2/2 Weft Lifting Plan



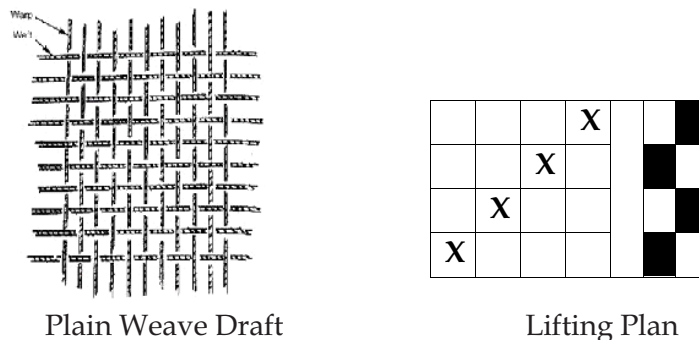
Source: Ajiginni Margaret (2013)

When yarns of the same colour are used in warp and weft interlacement, a third dimension effect is created. Consequently, the imitation and incorporation of this design and subject matter into traditional weaving techniques will enhance aesthetically woven fabrics. As such, the understanding and the incorporation of basic weaves will blend the traditional African, Eurocentric, and Afrocentric weaving cultures.

Basic Weave Structures

There are three basic weave structures for fabric production: Plain weave, twill weave, and satin weave. Weaving is defined by Martins (2007:1) as the method of interlacing two sets of threads, the warps (vertical) and the wefts (horizontal) threads, at right angles to create a cloth. "Structure" is defined by Sound (1996) as a technical drawing that shows information about details. Therefore, weave structure is the design by which different simple and complex fabrics are produced, and they can be created in different varieties and designs to enhance the look of apparel. There is a wide variety of basic weaves based on modifications of a few fundamental weaves. However, plain weave is the simplest and most important of all weaves; it requires only two shafts and has two warp and weft yarns in each weave unit. Without a vivid explanation of the technicalities involved in the warping and weaving process, practitioners will lack understanding.

Fig. 6



The draft for plain weave 1.1 is the simplest of the plain weave variations. The warp yarns are held parallel under tension while the inserted weft yarn is shot over and under alternate warps. Each time the weft yarn is passed from selvedge to selvedge through the warp shed, the reed or the beater is used to beat down the weft yarns onto the fall of the fabric, thereby interlacing both yarns at an angle. Fabric length is increased with the insertion of each succeeding weft yarn, and this operation is continuous until the warp yarns are completely woven.

Presentations of Basic weave Experiments

Experiment 1

Table 1

Warp Colour Order

Acrylic wool Black 55 Tex	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acrylic wool Orange 55 Tex	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Weft Colour Order

Acrylic wool Black 55 Tex	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Acrylic wool Orange 55 Tex	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Refer to plate 1 fig 1

When closely set, the plain weave structure is strong because it is over one and beneath one structure. Because intersections occur so frequently in the textile, the warp threads are held apart by the weft threads to create an intricate pattern. Plain weave requires just two shafts and is woven using only two sheds. It is a reversible weave, for the two cloth surfaces are identical. Plain weave draft is; (1, 2, 1, 2, 1, 2, 1, 2) therefore, plain weave because is closely set is regarded as the strongest, firmest, and most durable weave. Despite the variety of weaves available on modern looms, plain weave accounts for a considerable proportion of all woven fabrics.

Fig. 7: Plain Weave Draft and Design

2		2		2		2		2
	1		1		1		1	
								\
								\
								\
								\
								\

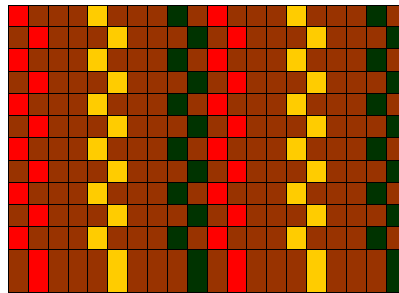
1/1 Plain Weave Draft



Woven Plain Weave Fabric

Source: Ajiginni Margaret (2013)

Fig. 8



Colour Variation Plain Weave Draft



Title: African Wealth
Medium: Weaving Technique
Source: Margaret Ajiginni (2013)

The Model

This classic dyed customized green skirt and blouse are blended with polychromatic plain weave interlacement, with a combination of straight lines and curves that express brilliance in a simplified style. In a discussion of weave structures, plain weave is the "very beginning". Plain weave, when closely set, is strong because of its over-one and under-one structure. This woven fabric was executed using polychromatic acrylic wool threads, an 8-reed count, warp arrangement that consisted of 6 red, 5 brown, 6 yellow, and 8 green, and a weft arrangement that consisted of only 1 brown on a table loom with two shafts.

The use of different values of warm and cool hues of red, orange, green, and brown creates a rich and beautiful streaked fabric. The cool hues in the warp appear more prominent when the weft colour is warm. As a result, the warm threads of red and orange in the warp direction are prominent because the weft thread is brown; as such, the colour effect is luminous. When the value of the weft is intermediate between warm and cool hues in the warp, the fabric reflects both light and dark specks-the red and orange hues advance while the green and brown hues recede to the background.

In the woven fabric, contrasts of light and dark are brought out strongly in some places and subdued in others. In both skirt and blouse, plain weave interlacement is transformed into geometric design while at the same time creating a linear flow like the River Niger in the overall geometric effect that blends perfectly with the dyed indigenous dress. Thus, the overall effect achieved a rich African and Continental sophistication and a glamorous look.

Experiment 11

Table 2

Warp Colour Order

Acrylic Wool Black 55 Tex	2	2	2	2	2	2	2	2	2	2	2	2	2
Acrylic wool Orange 55 Tex	2	2	2	2	2	2	2	2	2	2	2	2	2

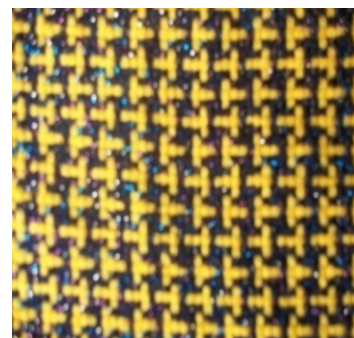
Weft Colour Order

Acrylic wool Black 55 Tex	2	2	2	2	2	2	2	2	2	2	2	2	2
Acrylic wool Orange 55 Tex	2	2	2	2	2	2	2	2	2	2	2	2	2

Fig. 9: 2/2/ Basket Weave Draft and Design

2	2			2	2					2
		1	1			1	1	1		
									\	
									\	
									\	
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									\	
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2/2 Basket Weave



2/2 Woven Basket Weave

Source: Ajiginni Margaret (2013)

Experiment III

Table 3

Warp Colour Order

Acrylic wool Black 55 Tex	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Acrylic wool Orange 55 Tex	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Weft Colour Order

Acrylic wool Black 55 Tex	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Acrylic wool Orange 55 Tex	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Refer to Plate 3 Fig 1.3

Fig. 10: Plain Draft and Design

2	2	2				2	2	2				2								2
			1	1	1							1	1	1						

3/3 Plain weave Draft



3/3 Plain Weave Fabric

Source: Ajiginni Margaret (2013)

Experiment IV

Table 4

Warp Colour Order

Acrylic wool Black 5 Tex	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Acrylic wool Orange Tex	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Weft Colour Order

Acrylic wool Black 55 Tex	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Acrylic wool Orange 55 Tex	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Refer to Plate 4 fig 4

Weaving the Cloth

Once the loom is dressed and the weft yarns are prepared, the weaver sits facing the front of the loom. The first shaft in the pattern is raised, creating an opening in the warp called a shed. Shafts are rectangular frames to which a series of healds are attached, and as each warp yarn comes from the warp beam, it passes through the eye mail of the healds on the shaft with the aid of the heald hook (White, 2001: 1). The weaver passes the shuttle through the opening, laying the weft thread across the bottom layer of warp threads. Next, the second pattern harness is raised. The new shed is opened and the weaver grasps the beater (the rectangular frame that holds the reed) and pulls the weft thread snugly toward the front of the loom. Each time the weft thread is passed from selvedge to selvedge through the warp shed, the reed or the beater is used to beat down the weft thread onto the fall of the fabric, thereby interlacing both threads at an angle. This operation is continued until the warp threads are completely woven.

Discussion of Findings

Basic weave patterns can create various degrees of durability in fabrics apart from their utility and values in textile and fashion. The incorporation colour variations technique, weft colour order, and the presentation of the basic weave experiment will make many basic structure drafts available for proper comprehension and appreciation. It will as a reference point and documentation procedure for small and medium-scale textile industries as they experiment and explore new weave structure possibilities like Ada Nwakata with Akwete weave structure in Eastern Nigeria and Deola Sagoe lace Aso-oke in Western Nigeria. Also, inspire the establishment of small and medium-scale enterprises toward entrepreneurial practice, and provoke artistic renaissances. This study is conceptually relevant because it will improve and boost weaving techniques among art practitioners. There is no prohibition against using compound weaves from other countries, but critical that African art practitioners and all learning institutions begin to modify our traditional weave techniques by understanding and interpreting basic weave structures to produce more plain weave variations on fabrics. The essence is to create a platform for the appreciation of this weave structure as well as its viability as an entrepreneurial opportunity in the cottage and fashion industries.

Conclusion

The study attempts to present as understanding and interpretation of fundamental basic weave structures for fabric production. It established that the plain weave structure experiment has created basic designs from a limited application in clothing into a breadth of infinite design possibilities that are expected to have a wider appeal to end-users. The basic weave was developed from $\frac{1}{2}$, 2/2, 3/3, 4/4, and 5/5 structures to create an array of creative weaves for fashionable outfits for end-users.

The result of the study further sustains the traditional cloth in the modern competitive textile market and creates employment opportunities for teaming unemployed youths. At the same time, two important factors are helping to preserve the legacy of African woven cloths. The continent is diverse and home to many intriguingly woven textiles

that are steeped in tradition at two levels. They are deemed essential for ceremonies and in certain traditional ceremonies, locally woven textiles are becoming increasingly sought after nationally and internationally.

The production of experimental basic weave samples will forge new fabrics with the appeal that could aesthetically enhance contemporary attires and with the potential to influence creativity globally. Globalization complicates matters even more because the aesthetics of contemporary art practitioners cannot be discussed without considering transnational paradigms and hybrid visions. Thus, conventions and innovations become real through the process of adaptation or hybrid and are transmitted from one generation to another.

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