With the Same Yarn, What Sets the Character of a Cloth Is the Number of Interlacings

— Counted over an 8×8 repeat, plain weave has 128 interlacings (points where over and under swap), 2.000000 per cell, while twill and satin each have 32, or 0.500000 — the separator is whether one asks about the yarn or about the number of interlacings — [Paper 830]

Yuuki YAMAGISHI (山岸 勇輝)
Yamagishi Complexity Torus Lab, Japan
September 2026

— From thinking to syncing. —

Abstract

The same yarn can be made into plain weave or into satin.This paper counts, over a repeat, that what separates the cloths is not the yarn but two numbers: the interlacings and the float length.No new theorem or law is claimed. First, and this is the core. The interlacings differ fourfold with the weave——over an 8×8 repeat, 128 for plain weave and 32 for satin, a ratio of 4.000000 (Section 2). **Second, per cell that is 2.000000 against 0.500000——plain weave swaps at every cell; satin swaps once in four** (Section 2). **Third, fewer interlacings means longer floats——the longest run is 1 for plain, 4 for twill and 7 for satin** (Section 3). **Fourth, the face is a different quantity from the interlacings——the points showing are 32, 32 and 8: plain and twill agree at 32 while their interlacings differ by 4.000000** (Section 3). **Fifth, so "same yarn, same cloth" does not hold——without changing a thread, the interlacings run from 128 to 32 and the floats from 1 to 7** (Section 4). **Sixth, the separator is whether one asks about the yarn or about the interlacings——talk about a cloth's character mixes a question of material with a question of construction** (Section 4). **Keywords**: weave structure, interlacing, float, plain weave, satin, weave diagram.

Scope of this paper (scope note): **No new theorem or law is claimed——the weave diagrams of plain, twill and satin, and the effect of interlacings on softness and lustre, are known.Only two things are counted——the interlacings (adjacent cells where over and under swap) and the longest run of floating yarn.No performance is claimed——strength, stretch, slippage, lustre and creasing are not measured; only the direction in which interlacings and floats matter is stated.Yarn is not treated——thickness, twist, material and density are not included.No real fabric is discussed——particular cloths and uses are not the subject.Three dimensions are not entered——knitting, three-dimensional weaving and nonwovens are not treated.Relation to earlier papers**: **Paper 342 showed that mixing the same two materials in the same proportion can leave the stiffness differing by 16.93, and its scope note stated "no laminate is designed—classical lamination theory and weave patterns are not entered"——this paper sits in that seat, counting the weave itself by interlacings and floats.Paper 300 showed that whether two things share a root is decidable——"the yarn is the same" and "the cloth is the same" are distinct roots.**What is added is **counting the interlacings as 128, 32 and 32**, **measuring the longest floats as 1, 4 and 7**, **showing that equal faces can hide a fourfold difference in interlacings**, and **placing the separator on yarn versus interlacings**.

1. Notation and the Question

Setting: **warp and weft cross at right angles, and each cell records whether the warp passes over (1) or under (0).An 8×8 repeat is taken as the unit and three weaves are placed on it.**

Plain weave swaps at every cell (1 when $(i+j)$ is even).Twill runs four cells at a time and shifts diagonally.Satin sets a single 1 in each row, shifting by two cells.

An interlacing is a pair of adjacent cells whose values differ, counted in both directions; a float is the longest run on the same side.

Question: **what differs, and by how much, between cloths made from the same yarn?**

2. Counting the Interlacings

Computation 2.1: **over the 8×8 repeat, interlacings and face points were counted.**

weave	interlacings	per cell	points on the face
plain	128	2.000000	32
twill	32	0.500000	32
satin	32	0.500000	8

> **Observation 2.2**
>
> **this is the core. The interlacings differ fourfold with the weave.Plain weave has 128 and satin 32, a ratio of 4.000000——plain weave swaps at every cell, satin once in four.**

3. Floats, and the Face

Computation 3.1: the longest run of floating yarn was measured.

weave	interlacings	longest float
plain	128	1
twill	32	4
satin	32	7

> **Observation 3.2**
>
> **fewer interlacings means longer floats.The run grows from 1 in plain weave to 7 in satin——and at the same count of interlacings (32 for both), twill gives 4 and satin 7, so where the interlacings sit matters as well.**

> **Observation 3.3**
>
> **the face is a different quantity.Plain and twill both show 32 points on the face while their interlacings differ by 4.000000——equal proportions on the face do not mean equal construction.**

4. The Separator

> **Observation 4.1**
>
> **the separator is whether one asks about the yarn or about the interlacings.Without changing a thread, the interlacings run from 128 to 32 and the floats from 1 to 7——“same yarn, same cloth” does not hold.**

Observation 4.2

placed beside Papers 342 and 300.Paper 342 showed the same two materials in the same proportion differing in stiffness by 16.93, and stated that weave patterns were not entered——this paper sits in that seat and counts the weave itself.Paper 300 showed that sharing a root is decidable——"the yarn is the same" and "the cloth is the same" are distinct roots.

Observation 4.3

what is not said.Strength, stretch, slippage, lustre, real fabrics and yarn properties are not treated——what is shown is how far two numbers move under construction alone.

5. Census and Closing

1. **plain: 128 interlacings** (Computation 2.1): **2.000000 per cell.**
2. **twill: 32** (Computation 2.1): **0.500000.**
3. **satin: 32** (Computation 2.1): **0.500000.**
4. **ratio 4.000000** (Observation 2.2): **the core.**
5. **plain float 1** (Computation 3.1): **the shortest.**
6. **twill float 4** (Computation 3.1): **in between.**
7. **satin float 7** (Computation 3.1): **the longest.**
8. **face points 32, 32, 8** (Computation 2.1): **another quantity.**
9. **equal faces, fourfold interlacings** (Observation 3.3): **looks do not decide.**
10. **yarn or interlacings** (Observation 4.1): **the separator; Papers 342, 300.**

Closing: **With the same yarn, what sets the character of a cloth is the number of interlacings.Over an 8×8 repeat, plain weave has 128 interlacings (2.000000 per cell) against 32 (0.500000) for twill and satin, a ratio of 4.000000——plain weave swaps at every cell.Fewer interlacings means longer floats, 1 for plain, 4 for twill and 7 for satin, while the face shows 32 points for both plain and twill even though their interlacings differ by 4.000000——equal proportions on the face do not mean equal construction.None of this changes a thread, so the separator is whether one asks about the yarn or about the interlacings.Placed among the earlier papers——sitting in Paper 342's seat for weave patterns, and keeping Paper 300's discipline between yarn and cloth.To be honest——only interlacings and floats were counted; neither strength nor lustre was measured.**

References

1. Yamagishi, Y. (2026). *The Three Hundredth Census: Whether Two Things Share a Root Is Decidable* [Paper 300]. Zenodo. 10.5281/zenodo.22171914
2. Yamagishi, Y. (2026). *Mix the Same Two Materials in the Same Proportion and the Stiffness Differs by* **16.93** [Paper 342]. Zenodo. 10.5281/zenodo.22682160

— From thinking to syncing. —

Yuuki YAMAGISHI (山岸 勇輝)

© 2026 Yamagishi Complexity Torus Lab, Japan · Licensed under Creative Commons Attribution 4.0 International (CC BY 4.0)