

Prolegomena to a Grammar of Knitting

-or- “When all you have is a hammer...”

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March 11, 2016

Introduction

Introduction

- ▶ ~~Introduction to the knitting formal system.~~
- ▶ My contention:
 - ▶ There is no “knit” and “purl”, simply an unspecified “stitch” and monovalent [reverse] feature.
 - ▶ Consequently, “right side” and “wrong side” is property of Post-Construction Spell-Out.

Introduction to the formal system

Introduction to the formal system

*"Knitting is only two stitches: knitting and purling. And it's what you do with those two things." -Louise,
KnitBritish Podcast #54, 19 February 2016*

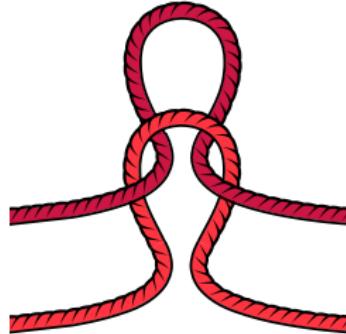
Knitting and Purling

“Knit” and “Purl” describe the relationship between the current stitch and the stitch in the row below.

Knit: **behind**



Purl: **in front**



Older Knitting Grammarians

1st Row,	Plain.	
2nd Row. P ³ edge,	O, Tr, P ¹⁵ , T, O, P, repeated 6 more times.*	P ² edge.
3rd Row, B ³ edge,	B, O, L, B ¹³ , Lr, O, B ² , do. each line to end.	B ² edge.
4th Row, P ³ edge,	O, Ti, O, Tr, P ¹¹ , T, O, T, O, P,	P ² edge.
5th Row, B ³ edge,	B, O, L, O, L, B ⁹ , Lr, O, Lr, O, B ² ,	B ² edge.
6th Row, P ³ edge,	O, Ti, O, Ti, O, Tr, P ⁷ , T, O, T, O, T, O, P,	P ² edge.
7th Row, B ³ edge,	B, O, L, O, L, O, L, B ⁵ , Lr, O, Lr, O, Lr, O, B ²	B ² edge.
8th Row, P ³ edge,	O, Ti, O, Ti, O, Ti, O, Tr, P ³ , T, O, T, O, T, O, T, O, P,	P ² edge.
9th Row, B ³ edge,	B, O, L, O, L, O, L, B, Lr, O, Lr, O, Lr, O, Lr, O, B ² ,	B ² edge.
10th Row, P ³ edge,	O, Ti, O, Ti, O, Ti, O, Ar, O, T, O, T, O, T, O, P,	P ² edge.

* The edge stitches are never repeated; they are merely worked at the beginning and end of the row.

Published by I. J. Gaugain,

From Gaugain, Jane (1840) *The Lady's Assistant for Executing Useful and Fancy Designs in Knitting, Netting and Crochet Work* 63 George St, Edinburgh

Modern Translations

2nd Row, P³ edge,
3rd Row, B³ edge,

O, Tr, P¹⁵, T, O, P, repeated 6 more times.* P² edge.
B, O, L, B¹³, Lr, O, B², do. each line to end. B² edge.

Written

2. k3, *yo, ssk, k15, k2tog, yo, k; repeat from * 6 times, k2;
3. p3, *p, yo, p2tog, p13, ssp, yo, p2; repeat from * 6 times, p2;

Chart

3►				○	✗								13		✗	○					◀2
				○	✗								15		✗	○					

Knitting Grammars

Must be context sensitive, because they frequently have a repeating pattern sandwiched between a row initial and row final special stitch.

Selvage Edge on an $n \times n$ rib

- ▶ $k(k^n p^n)^m s$

Construing the rules as re-writes from one row to the next.

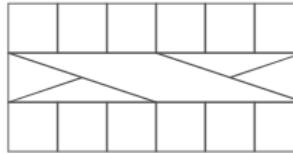
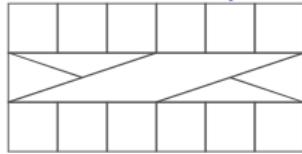
- | | |
|---------------------|-------------------------|
| ▶ $k \rightarrow k$ | ▶ $k\# \rightarrow s\#$ |
| ▶ $p \rightarrow p$ | ▶ $\#s \rightarrow \#k$ |

Knitting Grammars

Other attested rules

- ▶ $k \rightarrow p$
- ▶ $p \rightarrow k$
- ▶ $k \rightarrow kk$
- ▶ $p \rightarrow pp$
- ▶ $k^n \rightarrow k$
- ▶ $p^n \rightarrow p$

Linear transpositions



Not in the grammar

I am, of course, trying to focus on the *computational* and *algorithmic* level of analysis. There is a vast variety of *implementation* differences, which produce garments extensionally identical.

English

Continental

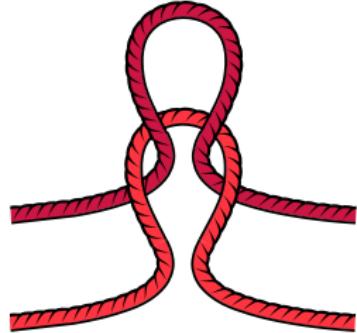
Scottish

The Featural Representation of Knits and Purls

Knitting and Purling

“Knit” and “Purl” describe the relationship between the current stitch and the stitch in the row below.

Knit: **behind**



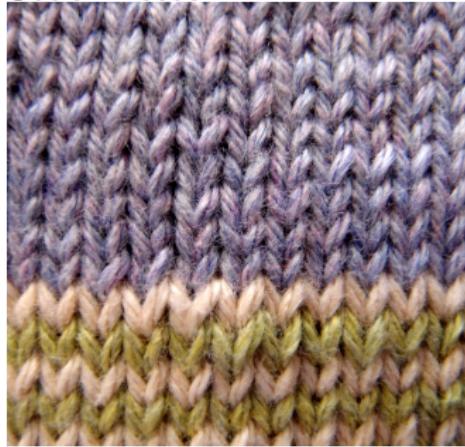
Purl: **in front**



Knitting and Purling

“Knit” and “Purl” describe the relationship between the current stitch and the stitch in the row below.

Stockinette:



Reverse Stockinette:



“Knits” and “Purls”

Given conventional wisdom, an analyst might be tempted to propose two primitives to the knitting system: knit and purl, or *k* and *p*. But a *p* is just the reverse side of a *k*, and vice versa. This is a situation begging for more abstraction.

[reverse]

I'll propose a [reverse] feature, which when applied to a *k* makes it a *p*, and when applied to a *p* makes it a *k*.

k $\xleftarrow{\text{rev}} \quad \text{p}$

ssk $\xleftarrow{\text{rev}} \quad \text{p2tog}$

k2tog $\xleftarrow{\text{rev}} \quad \text{ssp}$

m1r $\xleftarrow{\text{rev}} \quad \text{m1l}$

This necessitates only one stitch type, but which is it?

Which Stitch?

Is the universal situation:

- ▶ k
- ▶ k[rev]

or

- ▶ p
- ▶ p[rev]

The case for *k*

- ▶ The hobby is called “knitting”, not “purling.”
- ▶ The intuition of most knitters is that knits are default.
- ▶ When learning to knit, people first learn to knit, then to purl.
- ▶ Knits are by far the most common right-side stitch in garments.

Insufficient Grounds of evidence for k

- ▶ There are many garments for which default k is unparsimonious.
 - ▶ Garter & Seed stitch: even numbers of p and k
 - ▶ Some jumpers are p dominant.

Unspecified Underlying Orientation

My proposal: There is no underlying orientation to stiches. There is one underlying stitch s , unspecified for orientation, and a row is comprised of a string of ss which are specified or unspecified for [rev]

Traditional

- ▶ kkppkkpp

Abstracted

- ▶ [][] [rev] [rev] [] [] [rev] [rev]

OR

- ▶ [rev] [rev] [] [] [rev] [rev] [] []

Post-construction Spell Out

In a process of post construction spellout, the unspecified stitches are either given the values k or p

$[] \leftrightarrow k$

- ▶ $[\cdot][\cdot][\text{rev}][\cdot][\cdot][\text{rev}][\cdot][\text{rev}] \rightarrow kkppkkpp$

$[] \leftrightarrow p$

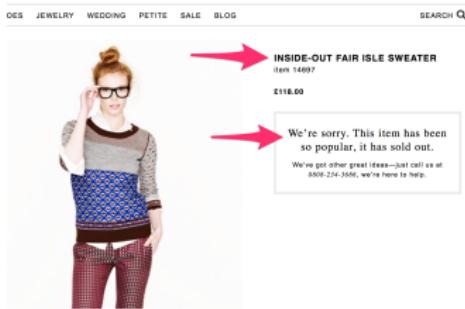
- ▶ $[\cdot][\cdot][\text{rev}][\cdot][\text{rev}][\cdot][\cdot][\text{rev}][\cdot][\text{rev}] \rightarrow ppkkppkk$

“Right side” and “Wrong side” are not properly defined until *after* construction.

Post-Construction Spell Out

“Right side” is arbitrary, e.g. inside out Fair Isle

J.CREW



Future Work

Future Work

- ▶ Further examination of older knitting grammars.
- ▶ Featural analysis of the twist of a stitch.
- ▶ A search for any island constraints on linear transformations (e.g. cables)
- ▶ Attempts to formalize slipped stitches and yarn overs.