

Prolegomena to a Grammar of Knitting

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

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March 11, 2016

Introduction

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- ▶ 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

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*"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*

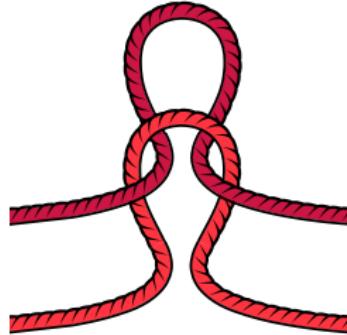
Knitting and Purling

“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

15

◀ 2

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.

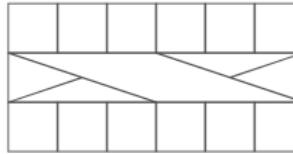
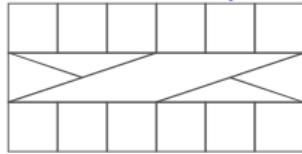
- | | |
|---------------------|-------------------------|
| ▶ $k \rightarrow k$ | ▶ $k\# \rightarrow s\#$ |
| ▶ $p \rightarrow p$ | ▶ $\#s \rightarrow \#k$ |

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

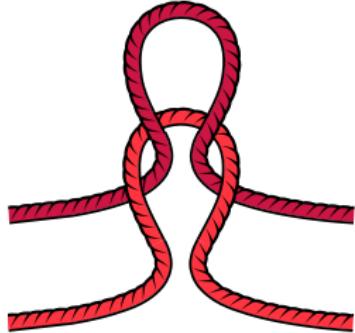
Scottish

The Featural Representation of Knits and Purls

Knitting and Purling

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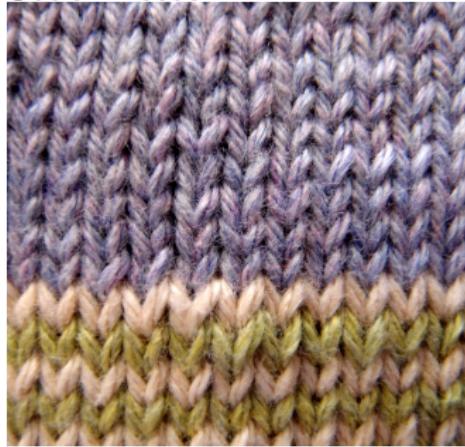
Purl: **in front**



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*

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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

$[] \leftrightarrow k$

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

$[] \leftrightarrow p$

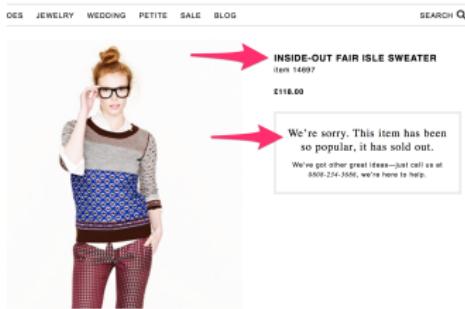
- ▶ $[\cdot][\cdot][\text{rev}][\cdot][\text{rev}][\cdot][\cdot][\text{rev}][\cdot][\text{rev}] \rightarrow ppkkppkk$

“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.