

Comparison Knitting Skills Between Experts and Non-experts by Measurement of the Fabric Quality

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Abstract. This research focused on the developing the capacity of knitting skill. The comparison of skill between the experts with non-experts was studied. The movement of arms was measured to investigate the effect of arm movement on quality of knitting fabric. The experiment was carried out with a video camera to record and analyze the differences of the knitting speed and manner in knitting. The quality of the fabric was measured by a loop of fabric to see the consistency of the loop fabric, which is important for beautiful fabrics. The results revealed the procedure used to crochet knitting machines were very different in appearance, knitting and speed. The quality of the fabric was beautiful, similar to the use of the knitting as machine knitting. The main difference between them was only part of the seams.

Keywords: Knitting · Arm movement measurement · Knitting skill · Plain pattern

1 Introduction

The knitting is a process of manufacturing a fabric by inters looping of yarns. Knitting is the second most important method of fabric formation. It can be defined as a needle technique of fabric formation, in which, with the help of knitting needles, loops are formed to make a fabric or garment. Fabric can be formed by hand or machine knitting, but the basic principle remains.

A knitting machine is a device used to create knitted fabrics in a semi or fully automated fashion. There are numerous types of knitting machines, ranging from simple spool or board templates with no moving parts to highly complex mechanisms controlled by electronics. All, however, produce various types of knitted fabrics, usually either flat or tubular, and of varying degrees of complexity. Pattern stitches can be selected by hand manipulation of the needles, or with push-buttons and dials, mechanical punch cards, or electronic pattern reading devices and computers.

Manual knitting machines require the knitter to move the specific needles, based on a chart, into pattern position. In this research I study the knitting structure is plain and rib. Plain knit, the basic form of knitting can be produced in flat knit or in tubular (or circular) form. It is also called jersey stitch or balbriggan stitch. A row of latch or beard needles is arranged in a linear position on a needle plate or in a circular position on a cylinder. Rib stitch produces alternate lengthwise rows of plain and purl stitches and as such the face and back of the fabrics are a lookalike. Rib stitch can be produced on a flat rib machine as well as circular rib machine.

2 Experimental

One expert and six non-experts were recorded their movement during knitting process. By all of them used the same material and same pattern in this experiment. Figure 1 shows the knitting process in this study.

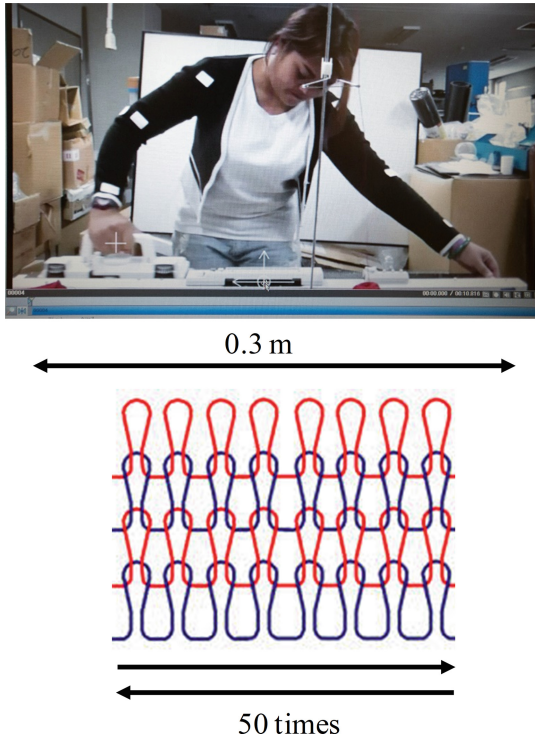


Fig. 1. Knitting process

3 Results and Discussion

3.1 Knitted Fabrics

Figure 2 shows the final knitting products from the expert and the non-experts. It is difficult to inform which one is poor or good quality by eyes.

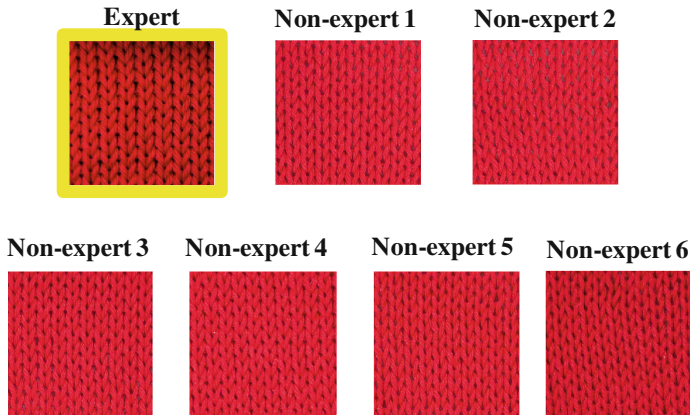


Fig. 2. Photographs of knitting fabrics from the expert and the non-experts

3.2 Quality of Knitted Fabrics

The quality of knitting fabric was observed by the symmetry of knitting loop. The blue line represents the loop of knitting pattern. The length from the center of the curve on the left side to the top curve was measured as well as the right side. In addition, the length from the center of the left curve to right curve was also measured as presented in Fig. 3.

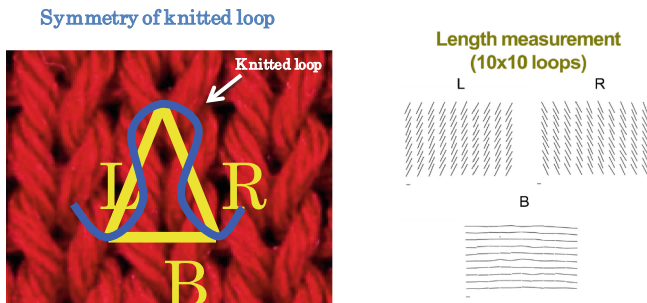


Fig. 3. Observation for the quality of knitted fabrics

3.3 Symmetry of Knitted Loop of the Expert and Non-experts

From Fig. 4(a), it was found that the length of left side and right side of the expert are quite symmetry as show in the length distribution curves. Figures 4(b) to (g) show the result of non-experts. It can be seen that non-expert 2 and 4 showed the symmetry of loop whereas the other revealed the non-symmetry between L side and R side.

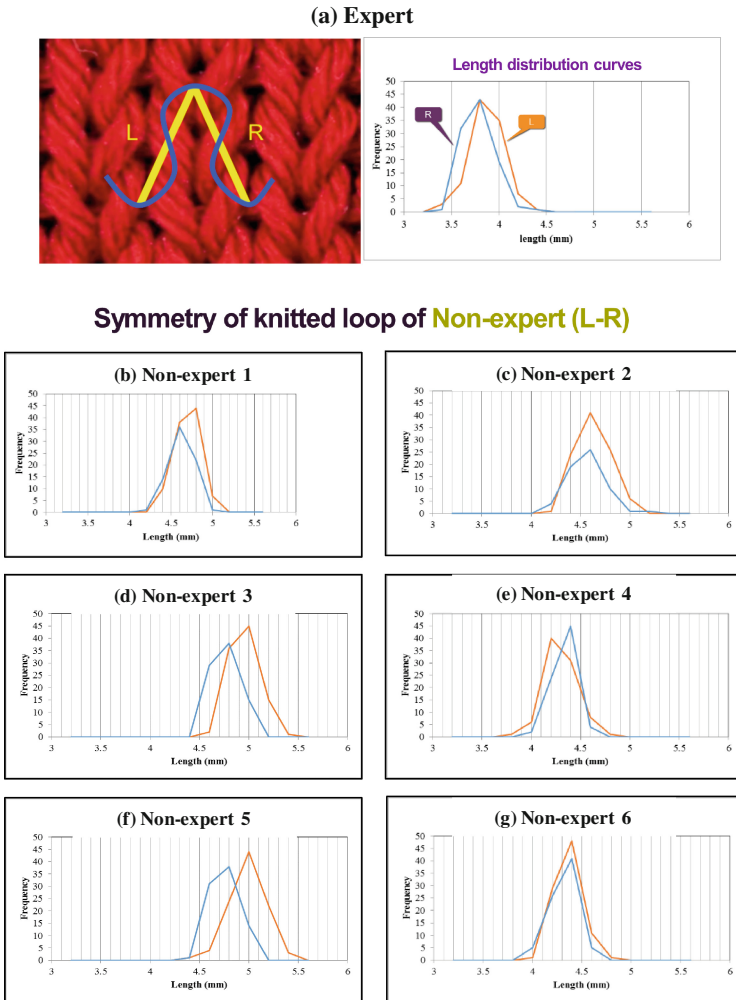


Fig. 4. Symmetry of knitting loop from the expert and the non-experts

3.4 Relative Handle Moving Distance and Times of the Expert and Non-experts

Figure 5 shows the relative handle moving distance and times of expert. The moving distance is in range of -0.3 to 0.3 .

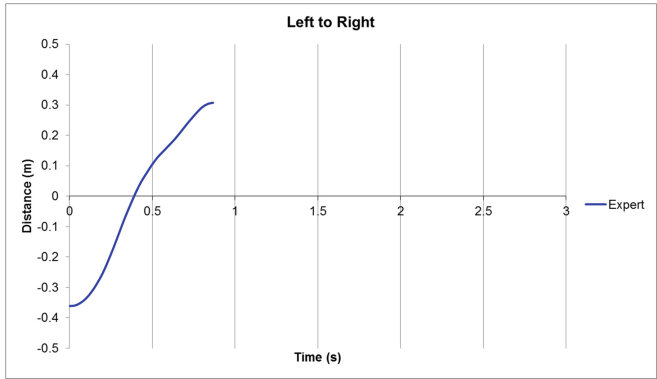


Fig. 5. Relative handle moving distance and times of the expert and non-experts

When compare with non-experts, it was found that the non-experts took longer time for moving the handle from left to right. However, their distances were in the same range as shown in Fig. 6.

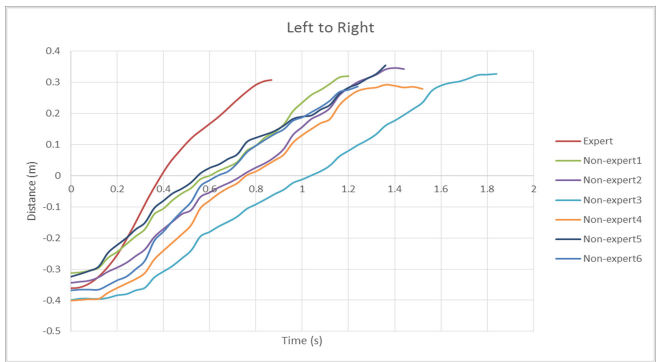


Fig. 6. Movement of the handle from left to right at the knitting of the expert and non-experts

3.5 Relative Velocity and Times of the Expert and Non-experts

Figure 7 presents the relative of velocity and times of the expert. The velocity rapidly increased and dropped obviously. The velocity dropped due to the high friction when handle move pass the fabric as a circle shown in Figs. 7 and 8.

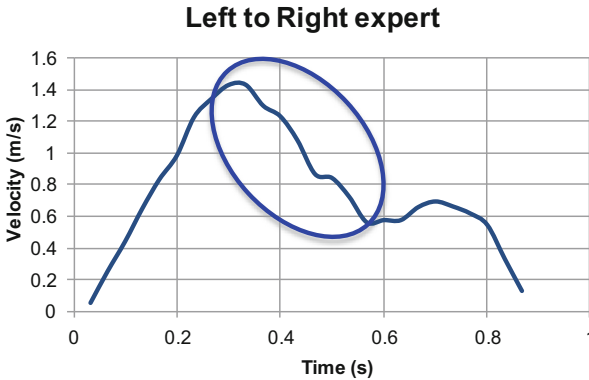


Fig. 7. Relative velocity and times of the expert

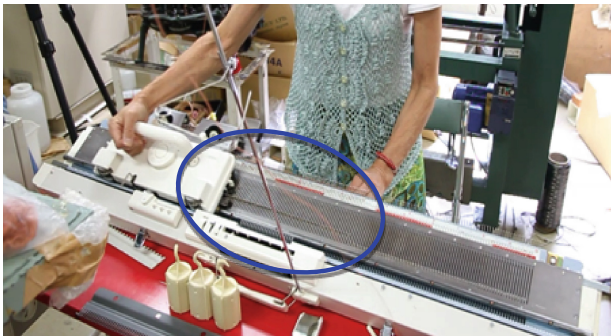


Fig. 8. Position of knitting fabric

Figure 9 depicts the comparison of the velocity between the expert and non-experts. The range of velocity that the handle move pass the fabric of non-expert lower than the expert.

3.6 Relative Acceleration and Times of Expert

For the expert, the acceleration rapidly increased and dropped obviously. Because the high friction occurred when handle moved pass the fabric, the results of the non-experts are quite different from the expert as presented in Fig. 10. Although, the tendency of them were quite similar, their curves of relationship between time and acceleration did not smooth when compare the expert. When the handle were moved pass the fabric, there is a high variability of acceleration. This may caused the less familiarity of the non-experts. The action of arm movement is also important for forced that propel the handle.

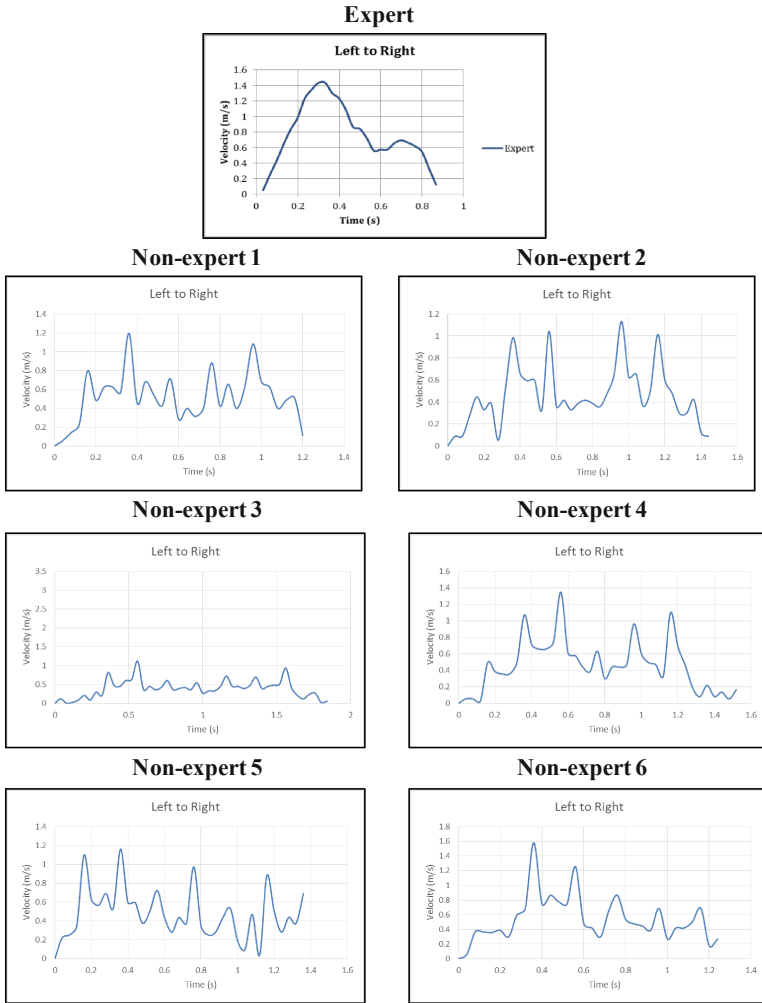


Fig. 9. Relative velocity and times of the expert and non-experts

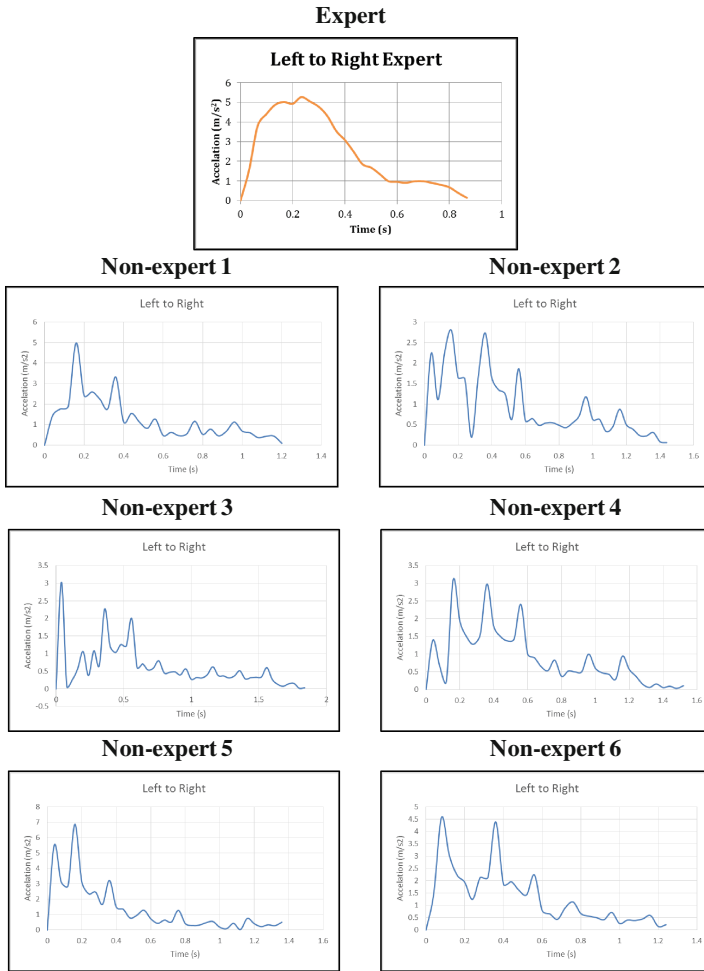


Fig. 10. Relative acceleration and times of the expert and non-experts

4 Conclusion

The comparison of the arm movement analysis between knitting expert and non-experts were reported. The expert showed the highest knitting speed by using the arm moving only. While non-experts used the rotation of body and some non-expert moved their body together with a handle moving to support arm movement because they held a handle incorrectly. That led to the slower knitting speed when compared to the expert. The higher knitting speed affected the bigger area under the knitting loop. For the next experiment, non-experts have to imitate the knitting behavior from the expert especially the arm position and the handle holding position. Then comparing their fabric quality and knitting speed.