Effect of a patternmaker's proficiency on clothing production

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Abstract

Purpose: We investigated how a patternmaker's proficiency affects the clothing pattern he or she produces by observing the overall patternmaking process.

Design/methodology/approach: We analyzed the patternmaking process by observing an expert patternmaker's work and listening to her explanation of the reasons for her decisions. Details of the patternmaker's proficiency in each stage of the process were investigated in terms of finding and solving problems. We observed her work to study the range of her discretion and the reasons for her decisions, and judged her work using expertize levels of educated, experienced, and proficient.

Findings: The proficient patternmaker was able to process information and make quick decisions, so that efficient patternmaking was possible. She was able to construct a representation of clothing from a given design, draw patterns of clothing imagined by the designer, and modify patterns according to the relationship between fabric properties and design. She was also able to produce a result that was equivalent, or in some aspects superior to, the designer's expectations. This is evidence of creativity.

Originality/value: Understanding a proficient patternmaker's skills is important to enable garments to be made efficiently. This paper clarifies the process of patternmaking and the proficiency of patternmakers. It will assist the development of efficient patternmaking systems and the management of patternmakers in fashion design.

Keywords: Patternmaker, Expert, Proficiency, Clothing, Pattern

Research paper

Introduction

Experts are usually considered as being proficient in their field, which, among other things, enables them to work more quickly. Understanding experts' behavior is important for improving work practices. Many researchers have studied experts by observing their performance in creative activities. Ericsson et al. (1993) examined the role of deliberate practice in the acquisition of expert performance. Simonton (1997) suggested a predictive and explanatory model of career trajectories and landmarks in creative productivity. Poulisse and Schils (1989) examined the influence of task and proficiency on learning language, taking into account the use of compensatory strategies.

Proficiency in creative activities was also investigated. The creative process was characterized by Johnson-Laird (1989), who stated that proficiency in the creativity region involves not only a skill that can be obtained by training, but also the discovery of new information and knowledge. Oura (2000) investigated proficiency in creative skills such as playing the piano and Kendo on the basis of cognitive psychology. She conducted experiments to investigate the effects of proficiency, and showed that proficient pianists and Kendo practitioners learn and play by understanding implicit and complicated information.

Creating clothing is an interesting creative activity that involves several processes and people. The first step in creating clothing involves a designer or design team setting up the concept of the season. Then, a designer produces a clothing design based on this concept. Even though clothing is three-dimensional, the design is usually presented as a series of two-dimensional illustrations. Based on these illustrations, a patternmaker constructs a representation of the clothing and then makes a pattern. A sewing factory then uses this pattern to make a garment.

The patternmaker's purpose is to make a clothing pattern that satisfies the designer. In making a pattern, a patternmaker interprets the designer's intention from the illustrations provided, and then makes the pattern using accumulated knowledge and skills. A proficient patternmaker can quickly make patterns that require few corrections by the designer. The knowledge and skills of the patternmaker are important in enabling garments to be made efficiently.

In this study, we investigated the effect of the patternmaker's proficiency on the patternmaking process and the resultant pattern, taking into account the patternmaker's information processing skills. We judged the expertize level using three levels of educated, experienced, and proficient

levels.

We asked a proficient patternmaker to make a pattern for a tailored jacket. Then, we observed and recorded her work, and asked her to describe the information processing that she applied to each process. We divided this information processing into problem finding and execution of plans to solve the problems that were found. We also discussed her range of discretion and the reasons for the decisions she made in solving problems, and then analyzed her work in terms of the three measures.

Experimental

In order to investigate a patternmaker's proficiency, we observed a process of patternmaking. First, we asked a Japanese designer to design a high-end jacket for women (Kim, 2013a, 2013b). The designer provided illustrations and measurements. The illustrations included a flat drawing of the back, as shown in Figure 1. The jacket was size 40 (Italian size), and the model measurements were height 170 cm, bust 83 cm, waist 66 cm, and hip 92 cm. The designer also selected a fabric for the jacket and attached a swatch. The fabric specifications are shown in Table 1.

We selected a Japanese patternmaker with a career extending more than 20 years for the experimental patternmaking. Then, we asked the patternmaker to produce the jacket pattern from the illustrations, measurements, and fabric swatch. We asked her to make an industrial manufacturing pattern that included lining and interlining information, and set the number of bodice pieces as four.

The patternmaker did not contact the designer during the process, and was allowed to exercise discretion beyond the information provided. Her working space was a lab room, and she used her own computer and CAD program. We recorded her work on video, asking questions while she worked. The questions were mainly about her thought processes, the reasons for her decisions, and the execution of her plan at each stage of her work.

Once the pattern was completed, a toile was made. The toile was shown to the designer, who checked the toile fitting on a dress form (Kiiya New kypris 9AR, Kiiya Co., Ltd). We recorded the designer's comments regarding toile modifications that were required, and took pictures of the toile while it was on the dress form. The comments and pictures were given to the

patternmaker, who modified the pattern accordingly.

After the experimental patternmaking, details of the patternmaker's proficiency in each process were investigated in terms of finding and solving problems. We judged the expertize level using three levels of educated, experienced, and proficient levels. The definitions of these proficiency levels are shown in Table 2. After investigating the work process, we judged the patternmaker's work in terms of these proficiency levels, taking into account the decisions she made and her reasoning, and then assessed her overall proficiency level.

Figure 1 Illustration of design (Kim, 2013a)

Table 1 Fabric specifications

Weave structure	Mass (g/m^2)	Yarn Count (warp × weft)	Density (yarns/cm) (warp × weft)	Material
plain	270	154 × 145 tex	11 × 7	Wool 80%/Nylon 20%

Table 2 Definitions of expertize levels

Level	Definition
Educated	knowledge and skills gained from reading, formal instruction and training
Experienced	knowledge and skills gained from work experience
Proficient	creative skills

Results and discussion

We divided the patternmaking process into five steps according to the traditional patternmaking method (Stephens Frings, 2007); 1) constructing a clothing model, 2) drafting the pattern, 3) fitting a toile to a dress form, checking and modifying by patternmaker 4) fitting a toile to a dress form, checking and modifying the pattern by designer, and 5) completing the pattern. The details of the analysis at each stage of the process and the expertize level of the patternmaker are as follows.

Constructing a clothing model

To construct a clothing model, recognition of the information contained in the designer's illustrations was necessary. In addition, the assumption of the wearer's measurements which were not provided was also necessary. When the patternmaker saw the illustrations, she organized information such as the number of the bodice pattern pieces, the existence and position of darts and the design lines, the number of darts, and the conditions (shape, length, and position) of the lines. The patternmaker imagined the attributes of the clothing, and then built a representation of the clothing.

Based on the design illustrations that were provided, she estimated that the target was young career women. This was not carried out using creative skills. Thus, this was judged to be at the experienced level.

She recognized from the illustrations that the clothing was fitted and had a squeezed waist, in line with the current trend. Measurements that had not been provided, such as shoulder, neck circumference, and center-back neck height were assumed based on her experience after considering the design lines of the illustrations, the measurements that were provided, and the current trend. Even though the measurements were not provided, those were able to be estimated from illustration. Thus, it was judged as being at the experienced level.

Drafting the pattern

In the patternmaking process, the first consideration was the selection of a plan of execution for the pattern drafting. The patternmaker selected a plan using a jacket sloper (basic pattern) of similar design for speed and efficiency. The jacket sloper is shown in Figure 2. Because to use sloper was able to carry out using knowledge from experience, this procedure was judged to be at the experienced levels.

Construction of a pattern considering a set of measurements was the next task. To construct a pattern, the patternmaker decided on the measurements of the pattern and drew lines, making use of her experience. Then, she used her knowledge (learning) about the relationship between the number of darts and the representation. The sloper was then modified based on the design illustrations and measurements. At this point, the darts, collar, lapels, shoulder line, and hemline were modified, and the position and size of details (buttons and a pocket) were also set. For drawing (creating) the shoulder line, knowledge, skills, and experience of what constitutes a beautiful line which she thought were used. Because she tried to create new lines according to the design, these were judged to be at the proficient level.

Next, the allowance was set and fabric properties were considered. The allowance was set using knowledge obtained from learning and experience, and after considering the silhouette. The amount of shrinkage and the allowance for collar folding were set taking into account the fabric properties. These were judged as being at the experienced level.

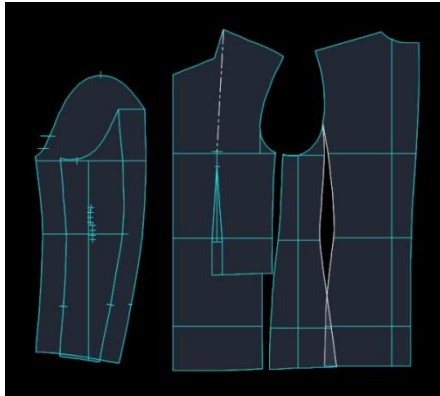The pattern, which is shown in Figure 3, was now ready for the fitting check.

Figure 2 Jacket sloper

Figure 3 Pattern for fitting check

Fitting the pattern to a dress form

To check the pattern, the patternmaker made a toile from thin sheeting fabric and placed it on a dress form, as shown in Figure 4. For efficiency, only half of the jacket was made. The patternmaker decided to use a shoulder pad of 1 cm thickness to produce the shoulder line.

First, the implementation of a plan for pattern fitting was considered. Because the armhole line could be changed after checking the bodice pattern pieces, the patternmaker checked the bodice

pattern pieces first and then checked the sleeve. Because the work used the knowledge from experience, this was judged to be at the experienced level.

Then, the patternmaker checked the fitting of the toile on the dress form in relation to the designer's illustrations, considering wrinkles, the shoulder pad, the sleeve, a silhouette of the waistline, details such as the pocket and the button, and the allowance. In addition to the design details, she considered whether or not the entire silhouette looked beautiful, based on her experience. After checking the pattern in relation to the representation, she judged that the waist was too loose, and modified the waistline to reduce the allowance. She also modified the front and back of the hip area to provide more swell, as shown in Figure 5. She added more allowance to the bust, and confirmed that the sleeve curved to the front as intended and the grain line was set correctly. She lowered the second button and moved the pocket, taking into account the balance. There were some wrinkles on the shoulder, so she reduced the slope of the shoulder line, as shown in Figure 6. This was judged to be at the proficient level.

The next task was to examine the possibility of sewing and to confirm the grain lines. Regarding the possibility of sewing, the patternmaker checked the shrinkage amount of the sleeve cap. The grain lines were checked and found to be sitting in the appropriate location and direction for a beautiful curve of sleeve. The patternmaker used the knowledge from experiences. Thus, this was judged to be at the experienced level.

The toile after checking and modifications by the patternmaker is shown in Figure 7.

Figure 4 Pattern fitting with sheeting fabric

Figure 5 Modifications of hip parts using
fitting patterns

Figure 6 Modifications of shoulder parts
using fitting patterns

Modifying the pattern

After checking the toile on the dress form, it was found that the pattern required modification. The patternmaker then modified the pattern according to the adjustments made to the toile. Then, she modified the pattern using CAD. In this step, the overall balance of the pattern was adjusted and the changes made to the toile were incorporated. This modification was judged to be at the experienced level. The toile was then shown to the designer.

Figure 7 Jacket toile

Toile check by the designer

The designer checked the toile, mainly checking the overall balance rather than the design details. Her overall impression was that the silhouette differed from that shown in the illustrations she had provided. She estimated that the toile could be aligned more closely with her representation by shortening the jacket length and adjusting the waistline.

The designer's directions for modification of the toile were as follows:

1) Raise the hemline, as shown in Figure 8 (a).

2) Raise the narrowest part of the waist by 5 mm and modify the whole waistline in accordance with this change, as shown in Figure 8 (b).

3) Widen the sleeve hemline by 5 mm and revise the entire sleeve line.

4) Move the second button higher, as shown in Figure 8 (c).

5) Move the dart line in the front section 3 mm toward the center, as shown in Figure 8 (d).

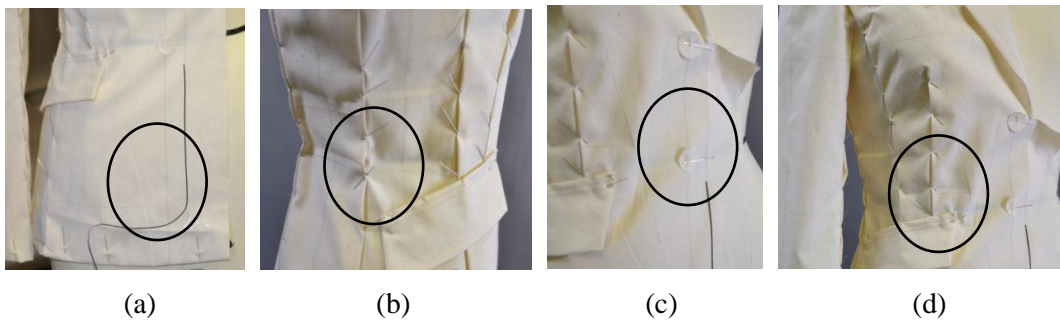6) Move the pocket back to the position shown in the illustration.

(a)　　　　　　　(b)　　　　　　　(c)　　　　　　　(d)

Figure 8 Modifications of the toile requested by the designer

Modifying the pattern according to the designer's directions

After receiving the designer's comments, the toile, and the pictures shown in Figure 8, the patternmaker confirmed the designer's requested changes by checking the toile on the dress form.

Then, in accordance with the designer's comments, she modified the hemline, waistline, sleeve, position of the second button, and position of the dart line at the front, taking into consideration the balance. Changing the dart position on the bodice changed the angle of the pocket, which she also modified.

During this process, the patternmaker took into account not only the modification of the pattern according to the designer's comments, but also the entire balance of the pattern in order to maintain a good shape.

In addition to responding to the designer's comments, the patternmaker checked the entire pattern. Even though the designer did not mention the vent, the patternmaker decided to raise the vent by 4 cm for balance. For usability and sewability, the pocket width was also changed

from 13.5 cm to 14 cm, and she moved the pocket position further toward the front.

Finally, she checked the modified toile on the dress form, as shown in Figure 9. These procedures were judged to be at the experienced level.

Figure 9 Modified toile on dress form after designer's feedback

Completing the pattern

After the modifications, the patternmaker completed the pattern by assigning the seam lines. Then, she drew the seam margins and identified the various parts of the pattern, as shown in Figure 10. She also drew the grain line and added sewing instructions. She then completed an industrial manufacturing pattern that included lining and interlining pattern. Because she used the knowledge from education, these procedures were judged to be at the educated level.
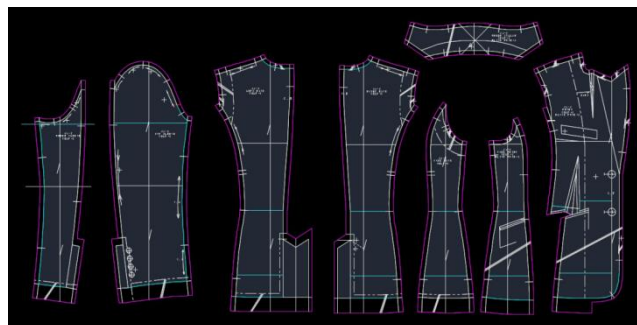

Figure 10 Completed patterns

Conclusion

The knowledge and skill of a proficient patternmaker was illustrated by studying the process of problem finding and problem solving during patternmaking. A proficient patternmaker was able to provide adaptive responses, taking into account the design and fabric properties. This proficient patternmaker displayed not only knowledge of clothing pattern theory and pattern drawing skills, but also an understanding of the value system in the fashion business, which involves making clothes that are beautiful, comfortable to wear, and meet the designer's expectations.

Before achieving proficiency, basic knowledge that is indispensable to patternmaking and recognition of typical clothing illustrations is necessary to make accurate representations of designs. Patternmakers can create accurate final patterns quickly and efficiently if they can grasp explicit information precisely. Further, the speed at which patterns can be drawn in accordance with specifications improves with training.

For the upper level of proficiency, an understanding of the non-explicit structure of clothing was necessary to rearrange complicated information that affected the design. Furthermore, this is tied to the proficiency required to create a garment within the tacit constraints contained in the illustrations and accompanying information provided by the designer.

Therefore, it was found that before becoming proficient, a less skilled patternmaker applies recognition and judgment using indispensable basic knowledge and solves problems through a precise understanding of explicit information, whereas a proficient patternmaker understands non-explicit and complicated information regarding the designer's intentions.

The proficient patternmaker was able to identify problems and find solutions after taking relevant constraints into consideration. It was also evident that the proficient patternmaker was able to create a representation that was more in line with the expectations of the designer. This is evidence of creativity.

These results have a commonality with the proficiency of a pianist or Kendo practitioner, as shown by Oura (2000).

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