

Construction of customers' emotion model in the bespoke tailoring using evaluation grid method

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Abstract—To realize a recommendation system that combines the benefits of human recommendation (experts in the field, e.g., salesclerks) and computer recommendation (recommendation algorithms, such as those in e-commerce), we constructed an emotion model that appropriately represents customers' emotions during a human recommendation process. As a typical scene of a recommendation by a human, we focused on bespoke tailoring in which a customer interacts with a tailor. First, we extracted emotions evoked in the scene using the evaluation grid method. After that, we constructed an emotion model by determining the extracted emotions' positions on the core affect model. As a result, we constructed an emotion model that appropriately expressed the emotions evoked in the recommendation process. In addition, we found that unique emotions such as troubled and expected are evoked in the recommendation by a human.

Index Terms—emotion model, human-human interaction, bespoke tailoring

I. INTRODUCTION

With the diversification of services and products, customers must make many decisions during purchase behavior. As a result, there is a growing demand for recommendation systems [1] that deal with large amounts of complex information on purchase behavior. The recommendation systems we use can be divided into two categories: a recommendation by a human (such as experts in the field) or a recommendation by a computer (such as a recommendation algorithm for e-commerce). Both recommendation systems free customers from choices with which they cannot deal by themselves. In other words, the recommendation system helps the customers' decision-making in the purchase process. However, a big difference between these two recommendation systems is whether or not there are interactions between customers and recommenders. In a recommendation by a human, a human makes a recommendation to the customer and the customer responds to the recommendation. Although a human recommendation can garner customers' trust [2], for humans to make a recommendation to every customer is time consuming. On the other hand, a computer recommendation uses a customers' purchase history and other people's purchase information to make a recommendation, and it can provide the recommendation immediately. Thus, the two recommendation methods both have advantages and disadvantages. A combination of these excellent points may offer customers more satisfying recommendations.

To realize such a recommendation system, it is important to clarify the human-human interaction and the human-computer interaction during the recommendation. To clarify the human-human interaction, Honda [3] focused on nonverbal behavior related to people's mental states. Honda examined the relationship between customers' nonverbal behavior and customers' mental states to clarify the importance of nonverbal behavior. On the other hand, Voeffray [4] clarified the human-computer interaction by researching the automatic detection of users' emotions to realize emotion-sensitive human-computer interactions. The emotions used in these studies were common (i.e., it did not assume emotion difference in different domains). However, the emotions differed depending on the domains in which they were evoked, and it is unclear if they reflect specific emotions in the field [5]–[7]. Therefore, this research tried to construct an emotion model that appropriately expresses customers' emotions during the recommendation process.

Human recommendations involve complex interactions, such as consultations and nonverbal behavior, and are considered suitable for the extraction of various customer emotions. Bespoke tailoring is a typical human recommendation and has a long history [8]. In this paper, we focused on bespoke tailoring while talking with the tailor (Fig. 1), and we aimed to construct an emotion model on bespoke tailoring.



Fig. 1. Examples of bespoke tailoring

We used a method from a previous study [5]–[7] that combines the evaluation grid method [10] and the core affect [9] to construct an emotion model via the two processes. (1) We extracted emotions evoked by bespoke tailoring using an evaluation grid method. (2) The extracted emotions were

positioned on the core affect, which expresses emotions in two dimensions: pleasure-displeasure and activation-deactivation. In this paper, the distribution of emotions on the core affect space is called the emotion model.

II. EXTRACTION OF EMOTIONS EVOKED IN A SCENE OF BESPOKE SUIT TAILORING USING AN EVALUATION GRID METHOD

A. Method

We conducted interviews using the evaluation grid method [10] to extract customers' emotions during bespoke tailoring.

The evaluation grid method [10] is an individual interview method for clarifying an individual's evaluation constructs. The procedure is a two-step interview with preference judgment and laddering (leading to related evaluation items). Preference judgment is used for extracting the evaluation items of compared objects perceived by participants. Laddering asks for specific factors (constructs of lower levels) that constitute the evaluation items and for abstract value judgments (constructs of higher levels) that invoke the evaluation items. The questions that ask for lower-level constructs are called ladder-down questions, and those that ask for higher-level constructs are called ladder-up questions. The participants' evaluation constructs are realized by repeating these questions.

We asked about the scene's positive and negative points compared with a ready-made suit's purchase scene as a question of preference judgment. After that, we asked about the causes of the positive and negative points and about the emotions evoked by the positive and negative points in response to preference judgments.

Thirty-seven customers (35 males and 2 females, 18-69 years old) participated in an interview just after completing bespoke tailoring at a suit manufacturing company's family bazaar (2018/9/15-17). The participants ordered at least one suit in consultation with the salesclerk. After completing the bespoke tailoring, the participants moved to a different room. The interviews were basically conducted on a one-to-one basis between the interviewer and the participant, and the participant answered questions on the positive and negative points of bespoke tailoring compared to the scene of purchasing ready-made clothes. The interview took 10 minutes for both positive and negative points.

In the data analysis, we used E-Grid (a visual analytics system for the evaluation grid method) [11]. Some of the obtained evaluation items had the same meaning, so those evaluation items were integrated and unified.

The threshold for adjusting the displayed evaluation items was 0.15 for the positive evaluation constructs and 0.36 for the negative evaluation constructs so that both the positive and negative emotion words were equal in number.

B. Results and discussion

We extracted 22 emotions. The positive emotions were attachment, willingness, happiness, good, pleasantness, feeling good, expectation, satisfaction, confidence, proud, uplifting, interesting, and peace of mind (Fig. 2). The negative ones were

regret, anxiety, dislike, troublesomeness, confusion, surprised, impatience, worry, and hesitance (Fig. 3).

Emotions and factors that evoke them are shown in Table I. In the bespoke tailoring, many emotions were evoked by different factors, and some emotions were evoked by the common factors.

TABLE I
THE EMOTIONS AND THE FACTORS THAT EVOKE THEM

Positive emotions	Factors
Peace of mind	High-quality parts
	Easy to move in
Interesting	Original suit
Proud	Original suit
	Proud
Confidence	Want to wear a good suit
	Giving a good impression to others
Satisfaction	Confidence
Willingness	Confidence
	Good look
Attachment	Handling the suit carefully
Expectation	Combination
Feeling good	Good evaluation from others
Pleasantness	Feeling good
Happiness	Pleasantness
	Expectation
Good	Giving a good impression
	Stress-free
Uplifting	Can express one's personality
Negative emotions	Factors
Troublesomeness	Taking a lot of time in bespoke tailoring
Hesitance	Having to deal with many choices
	Forced to buy
Regret	Fewer choices
	Can't express the identity
	Impatience
Impatience	Can't make decision at one's own pace
	Bad service from the salesclerk
Confusion	Lack of one's own knowledge
Surprised	Lack of one's own knowledge
	Lack of one's own knowledge
Worry	Companion's opinion
	Possible gap between intended suit and actual one
Dislike	Worry
	Worry
Anxiety	Difficult to imagine the completed suit
	Many processes to purchase suit

III. EXPLICATION OF THE NATURE OF EMOTIONS EVOKED BY SCENES OF BESPOKE SUIT TAILORING BASED ON CORE AFFECT

A. Method

To interpret the nature of the emotions evoked by bespoke tailoring, 22 extracted emotions were positioned on the core affect along pleasure-displeasure and activation-deactivation axes.

Twenty-seven university students and graduate students (17 males, 9 females, and 1 unanswered, 20-39 years old) participated in the evaluation experiment. Using Google Forms, the

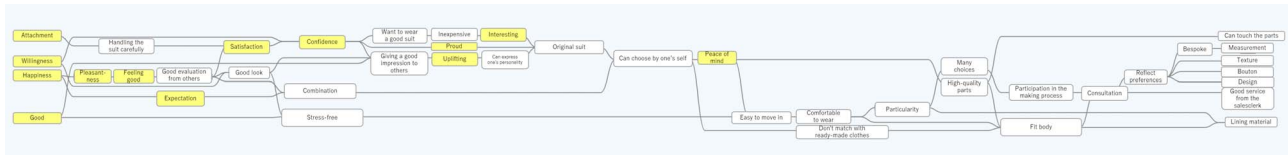


Fig. 2. The relationship diagram of emotions and factors of the positive points (Yellows nodes indicate emotions)

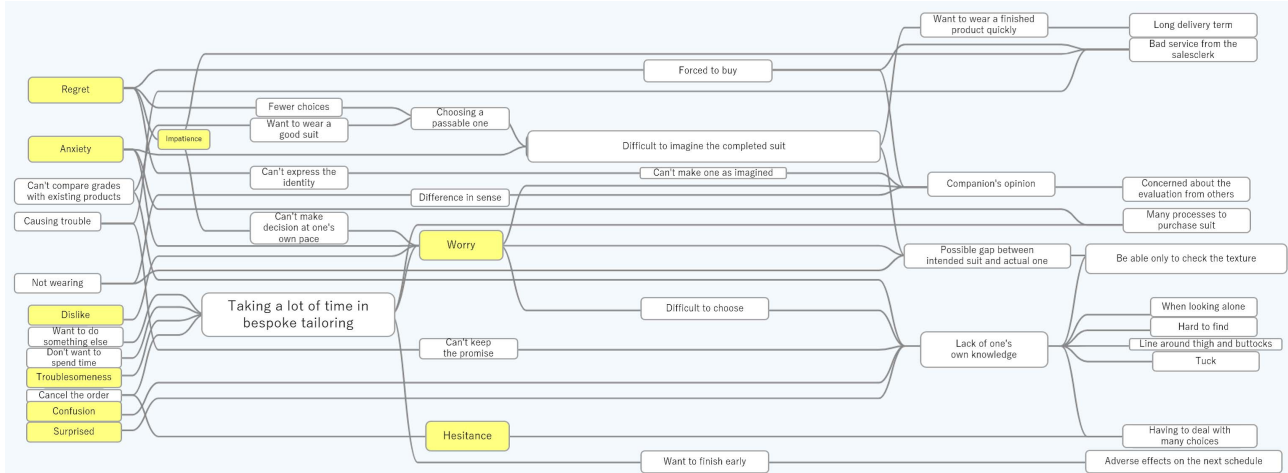


Fig. 3. The relationship diagram of emotions and factors of the negative points (Yellows nodes indicate emotions)

participants rated to what extent they felt pleasure-displeasure and activation-deactivation with respect to 22 kinds of emotions, with 1: displeasure - 5: pleasure and 1: deactivation - 5: activation..

For the obtained data, the evaluation value of each emotion was converted from 1(min) and 5 (max) to -2(min) and 2 (max). After that, the average rating value of all participants for each emotion was found. Based on each emotion's average rating value, we conducted cluster analysis using the Ward method. The result of the cluster analysis is shown in Fig. 4. The number of clusters was set to four, just before creating clusters with extremely few emotions.

B. Results and discussion

An emotion model constructed by determining the position of emotions on the core affect is shown in Fig. 5.

Cluster 1 included seven emotions: uplifting, interesting, willingness, confidence, happiness, pleasantness, and surprised. Cluster 2 contained four emotions: confusion, dislike, impatience, and anxiety. Cluster 3 contained four emotions: hesitance, regret, worry, and troublesomeness. Cluster 4 included seven emotions: satisfaction, feeling good, attachment, good, expectation, proud, and peace of mind. These clusters were characterized as: pleasure-activation, pleasure-deactivation, displeasure-activation, and displeasure-deactivation. Furthermore, among the extracted emotions, the specific emotions in bespoke tailoring, such as worry and expectation, did not exist in the Russell's original emotion circumplex [12]. Therefore, these emotions needed to be

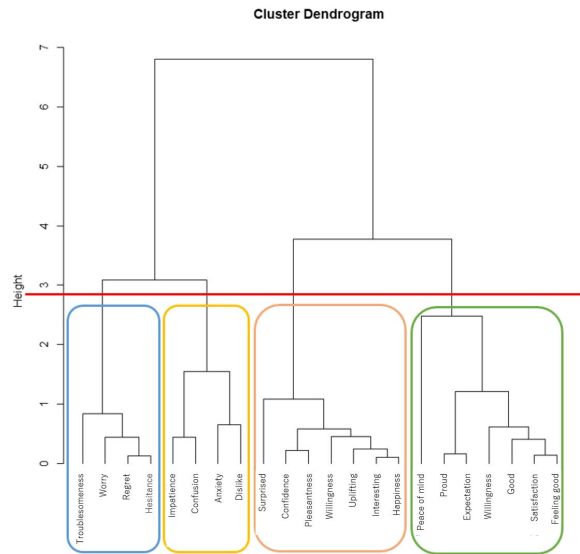


Fig. 4. The dendrogram of cluster analysis

positioned in the core affect. Our emotion model succeeded in expressing these emotions in the core affect. And as in previous studies [5]–[7], this study was able to extract emotions that did not exist in Russell's emotion model. The reason for being able to index unknown emotions is that we adopted dimensional models of emotion, like the core affect, that express emotions in two-dimensional space rather than

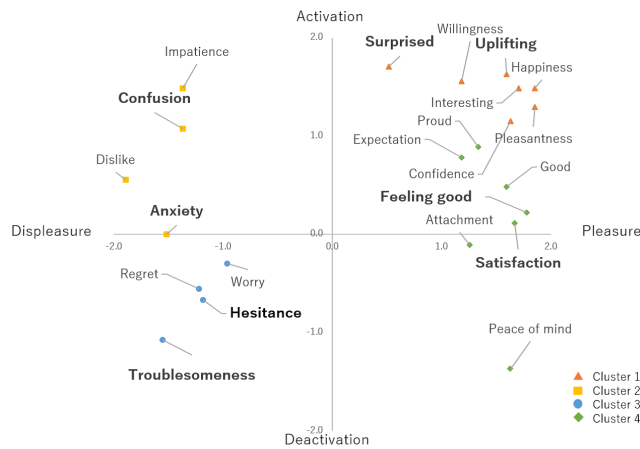


Fig. 5. The emotion model in the scene of bespoke suit tailoring (Bold words indicate the representative emotions)

categorical models of emotion as represented by Ekman's basic emotion theory that expresses emotions in categories (Six basic emotions: anger, disgust, fear, happiness, sadness, and surprise) [13]. These results suggest that the method of combining the evaluation grid method and the core affect can construct a domain-specific emotion model.

In addition, each cluster's representative emotions were selected to simplify the emotion model. The two emotions close to the cluster's center are the representative emotions of that cluster. Emotions close to the centroid of Cluster 1 are uplifting and interesting. Emotions close to the centroid of Cluster 2 were confusion and dislike. Emotions close to the centroid of Cluster 3 were hesitance and regret. Emotions close to the centroid of Cluster 4 were satisfaction and feeling good. However, dislike in Cluster 2 is a very strong negative expression and is considered a limited emotion in the human recommendation scene. Therefore, anxiety, the closest emotion to dislike, is one of the representative emotions of Cluster 2.

IV. CONCLUSION

In this paper, we constructed an emotion model for bespoke tailoring by extracting customers' emotions and determining the position of the emotions on the core affect. Bespoke tailoring evoked various positive and negative emotions. The emotions extracted from the bespoke tailoring were confirmed to evoke specific emotions that do not exist in Russell's emotion model [12], such as worry and expectation. We also determined the position of the emotions on the core affect and clarified four clusters: pleasure-activation (Cluster 1), pleasure-deactivation (Cluster 2), displeasure-activation (Cluster 3), and displeasure-deactivation (Cluster 4). The representative emotions of Cluster 1 were uplifting and interesting. The representative emotions of Cluster 2 were confusion and anxiety. The representative emotions of Cluster 3 were hesitance and regret. The representative emotions of Cluster 4 were satisfaction and feeling good.

The constructed emotion model appropriately expressed the customers' emotions evoked in the recommendation process, and these emotions would be useful tools for investigating interactions in human recommendations.

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