

A study on the view factor in sensory evaluation of human movement

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Abstract

Movements that fascinate viewers such as traditional dance and figure skating include "elements of beauty" which are expressed by multiple adjectives, for instance, "supple" and "elegant". Because elements that are perceived as beautiful in the movements are based on personal sensibility, clarifying "elements of beauty" quantitatively requires analyzing the cognitive structure of individuals who perceived beautiful and why they evaluated as beautiful. However, the appearance, clothes, and background of a person who performs movements may affect the viewers' evaluation criteria. This study examined the influence of the background in the evaluation of human movements. The results indicated that the evaluators' impression of the movement might change when they would be interested in the background.

Keywords

Background, Cognitive structure, Factor analysis, Movement, Sensory

1. Introduction

Movements that fascinate people such as traditional dance and figure skating include "elements of beauty" which are expressed by multiple adjectives, for instance, "supple" and "elegant". Because elements that are perceived as beautiful in the movements are based on personal sensibility, clarifying "elements of beauty" quantitatively requires analyzing the cognitive structure of individuals who perceived beautiful and why they evaluated as beautiful.

An element of beauty is involved in human movements which are expressed by kinematic data such as joint angles and joint moments [1]. However, the appearance, clothes, and background of a person who performs movements may affect the viewers' evaluation criteria. This study examined the influence of the background in the evaluation of human movements as a first step to indicate a relation between kinematic data and evaluation words such as beautiful. We clarified the influence of the background on the psychology of the evaluator when they evaluated human movements by performing factor analysis on the results of the questionnaire.

2. Subjective evaluation experiment

We prepared two types of videos in which the

same person walked at the same walking speed with the same stride (Fig. 1). The background of video A was downtown and that of video B was nature. The time length of each video was about 10 seconds. 30 people including men and women participated in the questionnaire survey.

We selected the appropriate evaluation words



(a) Video A



(b) Video B

Fig.1. Two types of videos

Table 1 Results of factor analysis

Evaluation words	Factor1		Factor2		Factor3	
	A	B	A	B	A	B
Movement: Fast	-0.196	-0.522	-0.059	0.183	0.026	0.308
Movement: Calm	0.747	0.132	0.231	0.618	0.158	-0.095
Movement: Monotonous	0.742	-0.194	-0.055	0.728	0.150	-0.030
Movement: Cheerful	-0.524	-0.473	0.231	-0.087	0.169	0.718
Movement: Gentle	0.780	-0.004	0.066	0.765	-0.067	-0.202
Movement: Soft	-0.057	-0.058	0.575	0.298	0.023	-0.077
Background: Like	-0.027	0.465	0.142	0.445	0.722	0.413
Background: Beautiful	0.133	0.273	-0.039	-0.227	0.334	0.872
Background: Bright	-0.336	-0.042	-0.060	-0.184	0.665	0.669
Background: Quiet	0.098	0.667	0.707	-0.183	-0.176	-0.062
Background: Relieved	0.507	0.490	0.236	0.010	0.347	0.018
Background: Natural	0.139	0.929	0.542	-0.043	0.510	0.075
Background: Calm	0.494	0.601	0.519	0.526	-0.024	0.095
Background: Friendly	0.124	0.624	0.740	0.482	0.332	0.031

for the evaluation of pedestrian movements and background to create the questionnaire items. 6 evaluation words including "Fast", "Calm", "Monotonous", "Cheerful", "Gentle", and "Soft" were selected to evaluate the movements. The evaluation words related to the background were 8 words "Like", "Beautiful", "Bright", "Quiet", "Relieved", "Natural", "Calm", and "Friendly"[3]. This study used the SD method. Therefore, we prepared the antonyms on the selected 14 words and created each evaluation word pair.

30 people including men and women participated in the questionnaire survey. The participants watched the two videos and answered the questionnaire. They answered 1 to 4 for each evaluation word (1: Very XX, 2: Slightly XX, 3: Slightly ○○, 4: Very ○○) [2].

3. Factor analysis

Tables 1 shows the results of factor analysis. The evaluation words, which had factor loadings of more than 0.5 in factor 3 of video A (contribution rate 11%) and factor 1 of video B (contribution rate 22%), were only related to the background. We have determined that these two factors were related to the evaluation of the background. Because the contribution rate of factor 1 of video B is twice that of factor 3 of video A, the evaluators might have been more interested in the background of video B than that of video A. This results indicate that the evaluator might not have been interested in the familiar scenery of Video A and might have concentrated on watching the pedestrian. On one hand, we have determined the evaluators might have mainly looked at the background as they were interested in the natural scenery of video B.

Both factor 1 of video A (contribution rate 19%) and factor 2 of video B (contribution rate 17%) include "calm" and "monotonous" which are the evaluation words of the movement, and "calm" which is the evaluation word of the background. This results indicate that the evaluators might evaluate the movement as "monotonous" and "calm" when they watched the calm background.

4. Conclusion

This study examined the influence of the background in the evaluation of human movements. The results indicated that the evaluator's impression of the movement might change when they would be interested in the background. It is necessary to use the background in which the evaluators would not show strong interest when examining the influence of the background in the evaluation of human movement.

REFERENCES

- [1] A. Yamasaki, Gait biomechanics (1) Kinematics and biomechanics of normal gait, The Japanese Journal of Physical Therapy, 47(5), pp. 429-437, 2013(in Japanese).
- [2] Y. Soeta et al., Effects of temperature of oshibori on kansei evaluation:- Investigation over four seasons (Differences of room temperature and sexual specificity) -, Transactions of Japan Society of Kansei Engineering, 13(1), pp. 239-245, 2014(in Japanese).
- [3] I. Shinmura, Kojien, Iwanami Shoten, Publishers, 2008.