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Impression Formation in Viewing Real Objects and Their 2D Images

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1. Introduction

A previous study[1] found that the cognition time for the images taken from the generic view point is significantly shorter than that for the images taken from the accidental view points. This finding suggests that the generic view facilitate the cognitive processing. How the generic and accidental view affects the observer's impression formation in viewing real objects and their 2D images? In this study, we conducted experiments to examine the effects of the viewpoints on the impression formation in viewing various objects in a real space, photograph, or drawing.

In this study, we conducted with experiments to understand how effective the following three factors are in impression formation in viewing various objects. The first factor concerned with the viewing points. We used seven viewing point conditions that include the four generic and three accidental views. We examined whether the generic and the accidental views of the 3D object have any consistent effects on the impression of the object, and whether there are any viewpoint conditions that have more influence on the object's impression than the generic and accidental views have for different objects. The second factor was the way to present the objects; the real objects, their photographs, and their drawings. Previous studies found the appearance of an object and its impression vary with the conditions of the way to present the object's image. For example, the apparent distance to a object in a real space tends to be smaller than that in a photograph while the apparent size of the object in the real space tends to be larger than that in the photograph[2]. The impression of a wedding dress would be looked as more brilliant and gorgeous when it was observed in a photograph than when it was observed in a drawing[3]. However, these previous studies did not examine effects of the viewing points on the impression formation in viewing different objects in a real space, photograph, and drawing. How the effects of viewing point on the impression are affected by the way to present the object? The third factor was the types of object: natural and artificial objects. We examined whether the effects of viewing points on the impression formation would vary with the observed objects.

2. Methods

For the real space observation, objects were presented as stimuli on a stand. Objects were set on a uniform gray background. There was the lighting installation right above an object Observers viewed the stimuli with fixing their heads on a chinrest. Observing distance was about 100 cm. We had six objects; three natural objects (apple, sweet potato and miniature

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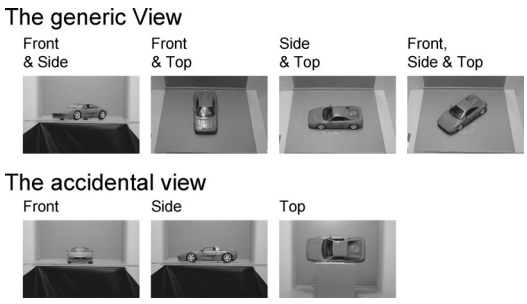

Fig. 1 Viewing point conditions.

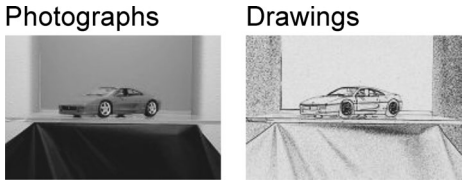

Fig. 2 Images of photographs and drawings.

horse) and three artificial objects (can, mobile phone, and minicar). 20 observers (11 males and 9 females) viewed the objects from the seven viewing points that include the generic views and the accidental views (**Fig. 1**).

For the photograph and drawing observation (**Fig. 2**), the images of four objects that were used in the real space observation (sweet potato, horse, mobile phone, and minicar) were presented on a CRT display (EIZO T565 17 inch). Photographs were taken so that the retinal size of the object in the photograph observation was the same as that in each of the real space observation. These photographs were taken by the use of a digital camera (FUJIFILM, FinePix 2900Z). Drawings were made from the photographs in terms of contour extraction program in Photoshop (Adobe ver.6.0). Observers viewed the stimuli with fixing their head on the chinrest. Observing distance was about 100 cm. 12 observers who participated to the real space observation and the other new eight observers viewed the photographs and drawings (10 males and 10 Females).

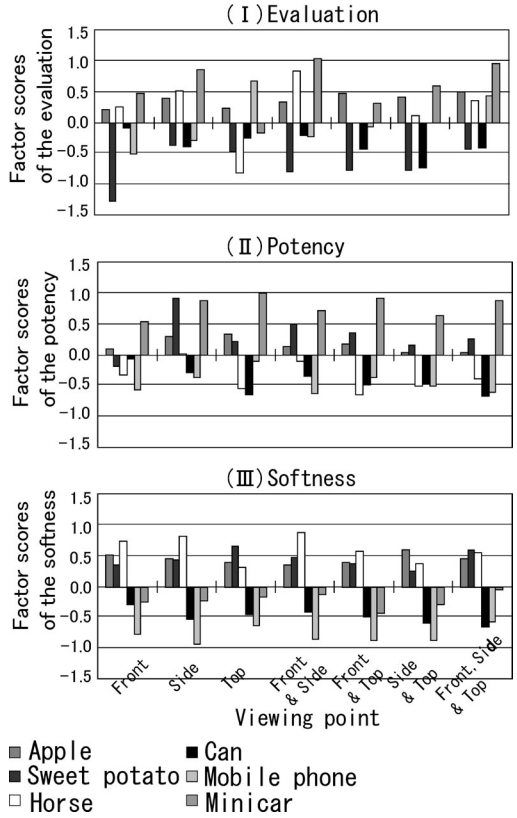

Fig. 3 Factor scores of the evaluation, the potency, and the softness of the real space.

Each object was presented in a random order. Observer rated their impression for the object by the use of 13 adjective pairs (See Table 1).

3. Result

3.1 Real space observation

We conducted a factor analysis (Principal factor solution, Varimax method) for the rated scores in 13 scales, and extracted three factors: (I) evaluation, (II) potency, and (III) softness (**Table 1**). We conducted repeated measure of analysis of variance (ANOVA) with the factors of viewing points (7) and objects (6) for the factor scores from the three factors (**Fig. 3**). The results of ANOVA and post hoc tests indicate that there were no consistent differences in the impression among the generic and accidental

Table 1 Factor loading and communality of each scale.

Real space

Factor type	Adjective pairs	Communality	Factor		
			I	II	III
I 21.9%	ugly–beatiful	0.627	0.785	−0.071	0.074
	trivial–happy	0.636	0.770	−0.199	−0.055
	rough–smooth	0.414	***0.591***	0.141	0.213
	fresh–old	0.329	***−0.551***	0.158	0.018
	dynamic–static	0.322	***−0.425***	0.251	0.280
II 19.9%	heavy–light	0.632	−0.031	0.795	−0.009
	large–small	0.588	−0.169	0.740	0.112
	thick–thin	0.501	−0.031	0.692	0.149
	fragile–tough	0.503	0.261	***−0.549***	0.365
III 10.9%	soft–hard	0.525	0.071	−0.152	0.704
	cold–warm	0.519	0.091	−0.244	−0.672
I·II	weak–powerful	0.617	***0.514***	***−0.594***	0.015
I·III	unlive–live	0.642	0.656	−0.218	***−0.406***

Photographs and drawings

Factor type	Adjective pairs	Communality	Factor		
			I	II	III
I 22.2%	ugly–beatiful	0.576	0.727	−0.101	0.193
	fresh–old	0.490	−0.655	0.209	−0.134
	trivial–happy	0.469	0.640	−0.239	−0.044
	rough–smooth	0.389	***0.588***	0.107	0.179
	dynamic–static	0.329	***−0.449***	0.330	0.135
II 19.0%	heavy–light	0.607	−0.183	0.751	−0.095
	thick–thin	0.416	−0.071	0.640	0.045
	large–small	0.408	−0.034	0.633	0.076
III 8.1%	soft–hard	0.620	0.304	−0.065	0.723
	cold–warm	0.296	0.241	−0.279	***−0.400***
I·II	unlive–live	0.641	0.624	***−0.459***	−0.202
	weak–powerful	0.584	***0.428***	−0.625	0.100
I·II·III	fragile–tough	0.596	***0.458***	***−0.431***	***0.448***

Each Roman numeral under the factor type shows the contribution of the factor. Gothic and bold italic numbers show the factor loading whose absolute values were more than 0.6 and 0.4, respectively.

viewpoint conditions. However, there was an obvious tendency that the viewing points from which we often obtain the image of sweet potato, horse, mobile phone, and minicar, exaggerated the positive impression for those objects in the dimension of the evaluation. For example, the impressions of the evaluation for the horse under the Side and Front & Side conditions were more positive than those under the Top and Front & Top conditions (**Fig. 3**).

3.2 Photograph and drawing observation

The factor analysis extracted the same three factors as for the real space observation (Table 1). We conducted repeated measure of analyses of variance with the factor of viewing points (7) and objects (4) for the factor scores from three factors for each result of the photograph observation and drawing observation. The results of ANOVA and post hoc tests indicate that, in photographs, the viewing point from

which we often obtain the image of the object exaggerated the positive impression in the dimension of the evaluation. In photographs, the viewing point from which we often obtain the image of the object exaggerated the positive impression in the dimension of the evaluation. However, there were no consistent effects of viewing point conditions for the drawing.

Natural objects gave the observers softer and warmer impression than the artificial objects did. However, there were no consistent differences in the effects of viewpoints between natural and artificial objects. In observing photographs, sweet potato and mobile phone as small objects generated strong positive impression in the dimension of the evaluation when viewed from its front (one of the accidental viewpoints) (**Fig. 4**).

4. General discussion

We found that the viewing point from which we often obtain the image of the object would exaggerate the positive impression in the dimension of the evaluation in the real space and photographs. In viewing the photographs and drawings, the effects of the viewing point would be mild when they are compared to the effects in the effects in viewing the same objects in the real space.

In this study, we conducted the experiment without directly comparing the real object, photographs, and drawings. Future study should compare directly the effects of viewing point between the real object and images presented through any of the visual communication media in order to find whether the effects of viewpoint would be different between the image obtained in a real space and that in those media.

References

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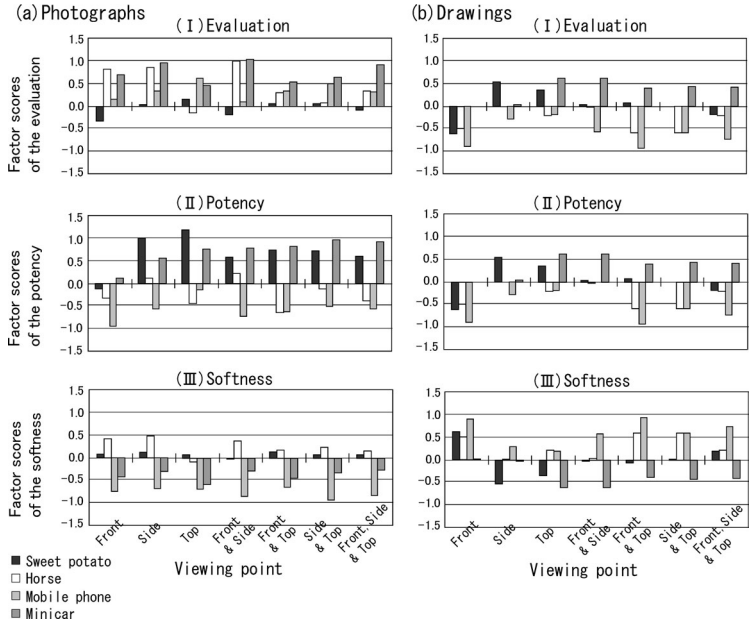

Fig. 4 Factor scores of the evaluation, potency, and softness of the photographs and drawings.