

The influence of facial photo processing on interpersonal impressions.

Agu Naoto, Kyoto Institute of Technology, Kyoto, Japan

Kubo Masayoshi, Osaka University of Art, Osaka, Japan

In recent years, the act of “emphasizing” facial photographs to improve the attractiveness of the face has become a notable practice in young people. The meaning that face photo processing has is due to the desire to become closer to an ideal face or to be evaluated by others with the appearance of print seal machines, photo-processing applications, and social networking services. This research specifically investigated what kind of impression photographs with facial processing make. We conducted two experiments. The results of Study I show that the impression made by the eyes and the jaw is greatly involved in the impression made by the entire face, regardless of whether it is male or female. In the case of a male face, the results of Survey II showed that an impression of manliness was based on the eyes, and an impression of warmth was based on the jaw. In the case of female faces, it was revealed that the impression of naturalness was based on both the nose and jaw, and inclusion was based on both the eye and jaw. According to the survey results, processing performed on the eyes and jaws is greatly involved in the formation of the facial impressions, and it is possible to make a specific impression by adding the appropriate processing to these parts. In the future, we expect that it will be possible to process in accordance with the face, purpose, and scene by clarifying the influence that facial photo processing has on interpersonal impressions in more detail.

Keywords: *photo processing; avatar; facial image*

1 Introduction

With the development of image-processing technology in recent years, processing facial photos to appear more attractive has become popular. Young people, in particular, are applying image processing to their facial photos on a daily basis. In fact, according to a survey conducted by the MMD research institute in 2016 (MMD labo, 2016), 58% of smartphone owners ($N = 167$) aged 15 to 19 answered that they processed their own images taken with their smartphones. Facial photo processing is motivated by a desire to be evaluated positively by others and from the satisfaction that comes from getting closer to the ideal face along through the use of technologies such as print seal machines, photo-processing applications, and social networking services (SNS). Based on this background, this study focused on how the degree of processing affects the impression formed by others.

2 Survey I: Analysis of the changes in impression resulting from different degrees of processing

2.1 Survey I

First, two average faces were made separately for men and women using Average Face Pro¹ for use in the evaluations. Next, using Adobe Photoshop², numerical values representing the degree of processing (i.e., 50, 100, 150, and 200) were applied to each facial feature (i.e., eyes, nose, and jaw) to create 32 sample images. To compare the sample images below and the original male or female average face, the change in impression was evaluated through seven-point scales running from strong to weak and good to bad (i.e., a Likert scale) as compared to the original image.

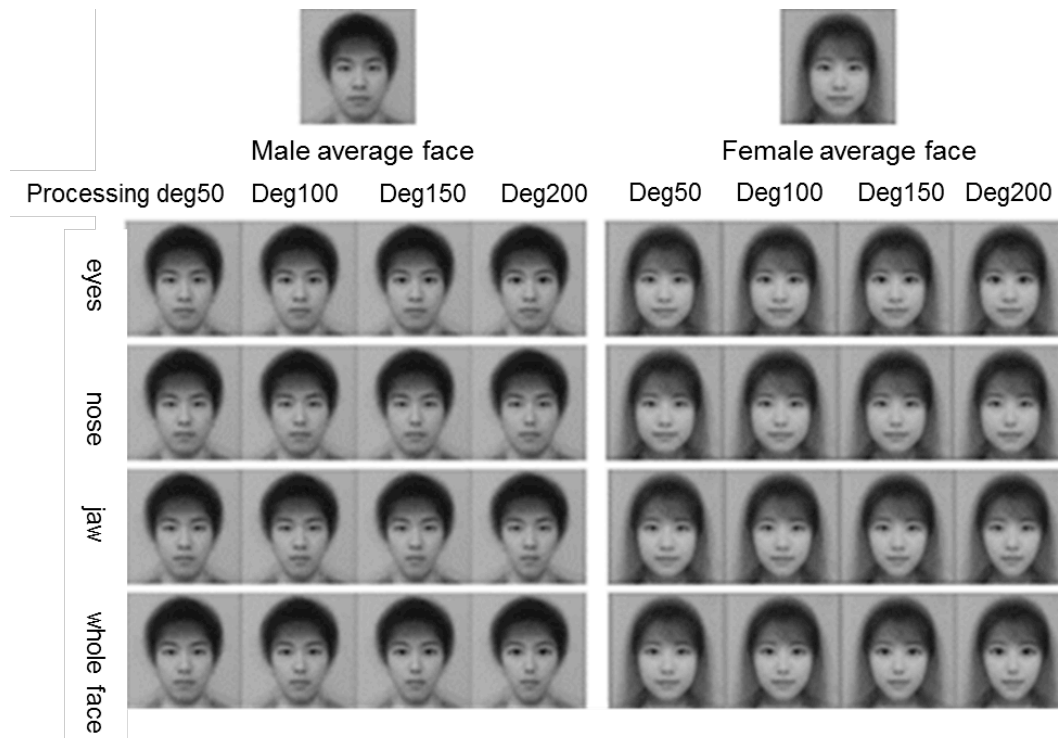


Figure 1. Sample image for impression evaluation

2.2 Survey I Outline

The survey period lasted from December 17, 2017, to January 2, 2018 and was distributed as a web questionnaire using Google Forms³. The number of acceptable answers was 110 (48 males, 62 females).

2.3 Survey I analysis and results

It became clear that photos with greater processing on the eyes and jaws were evaluated lower. It also became clear that processing applied to the eyes and jaws was greatly related to the impression of the entire face. The above-mentioned tendency was not seen in nose processing.

¹ Morphing application dedicated to face images

² Image editing software sold by Adobe Systems

³ Questionnaire analysis service provided by Google

3 Survey II: Specific impressions and effects of optimal processing

3.1 Survey II

First, we identified the evaluation terms used to describe facial impressions. A total of 10 participants (6 males and 4 females) were shown 7 photos of their face, and an experiment was conducted to evaluate the impressions received aloud. As a result of the experiment, a total of 202 words were obtained. From that, after antonyms and synonyms were summarized, the frequency of word appearance was analyzed, and the top 17 adjective pairs were selected.

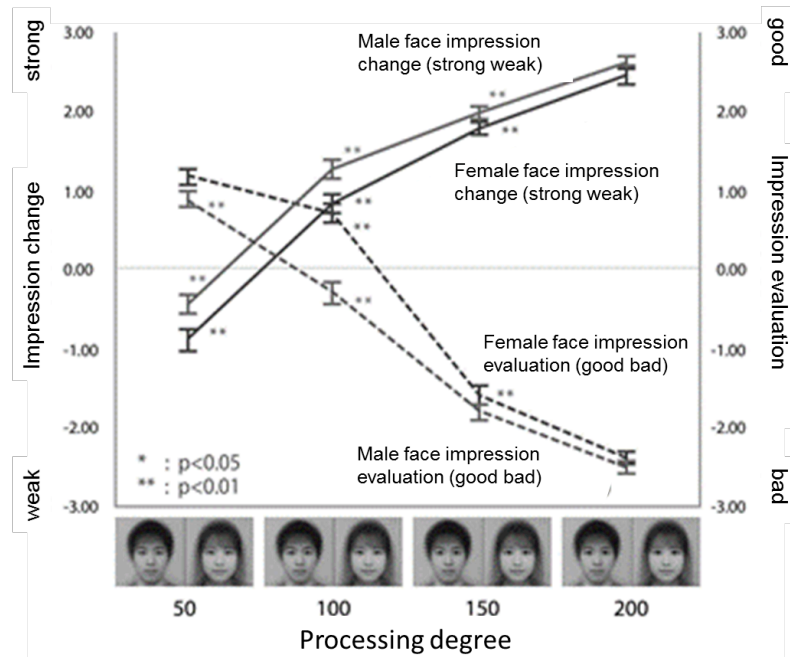


Figure 2. Analysis of image-processing degree, the initial impression, and resulting change in regard to the eyes.

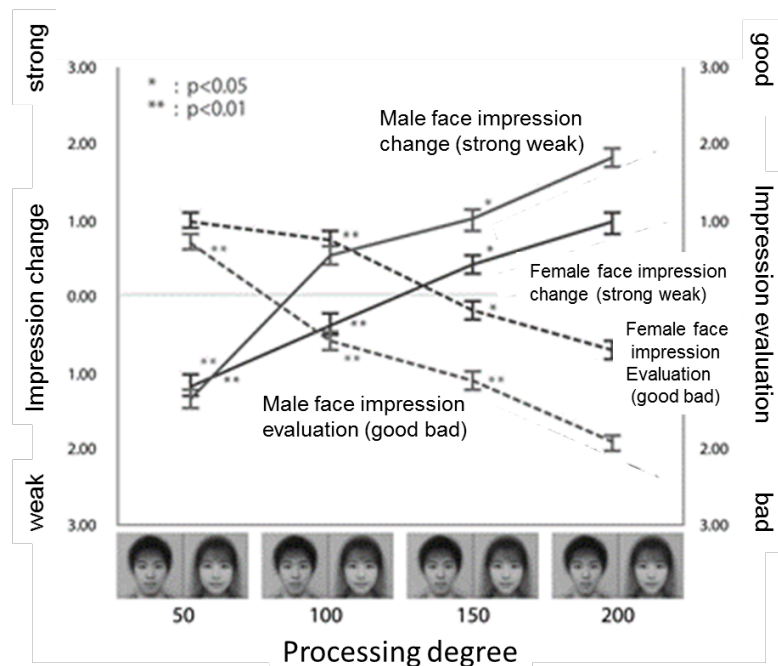


Figure 3. Analysis of image-processing degree, the initial impression, and resulting change in regard to the jaw.

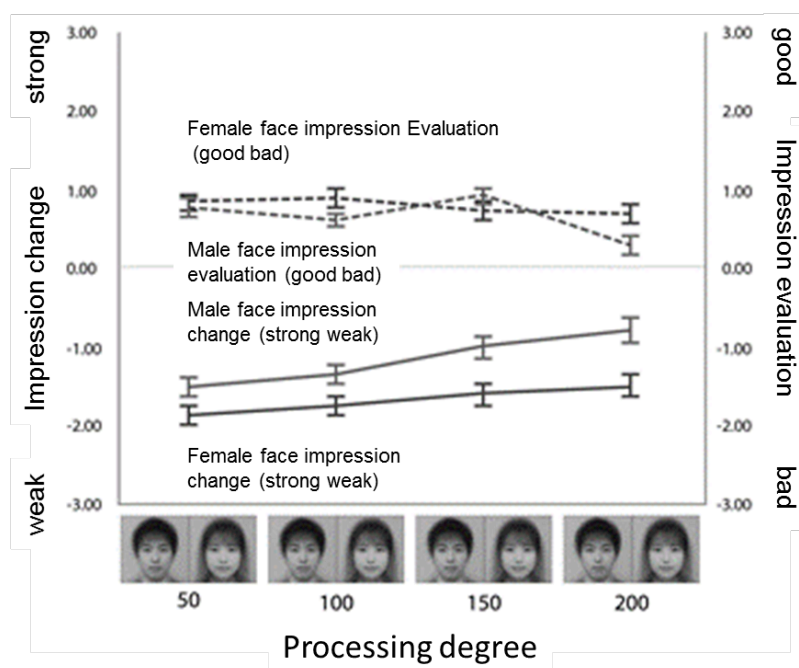


Figure 4. Analysis of image-processing degree, the initial impression, and resulting change in regard to the nose.

Furthermore, three adjective pairs were also selected from the previous research (Kato, Aoki, Shinohara, Murakami, & Miyazaki, 2015), and a total of 20 adjective pairs were selected.

3.2 Question item setting

The subjects were asked to operate Adobe Photoshop, and questions were asked to apply optimal processing to the average face used in Study I. Here, only the eyes and jaws were processed since processing applied to the nose did not affect impressions according to Survey I. In addition, the processing degree was kept within the range that Survey I identified as making better impressions (for male faces, 0–100; for female faces, 0–150). Then, the participants were asked for an overall concrete impression of the average face, their impression according to individual facial features, and whether the 20 adjective pairs selected in 3.1 applied.

3.3 Survey II outline

The survey period lasted from January 23, 2018, to January 27, 2018, and the method was an experiment using a questionnaire. The number of acceptable answers was 28 (15 male and 13 female).

Table 1. Results of factor analysis (male).

		I	II	III
10.	strong	.916	-.111	-.068
11.	healthy	.915	-.189	.182
18.	positive	.632	.331	-.291
8.	honesty	.599	-.202	.332
6.	bright	.575	.137	.047
19.	feminine	-.563	.038	.004
14.	fresh	-.051	.871	-.063
16.	elegant	-.258	.681	.267
2.	aesthetic	.097	.640	.129
13.	ambitious	.415	.635	-.258
5.	lean	-.480	.530	.091
17.	preferable	.198	.448	.242
12.	impressive	.108	.329	-.693
3.	warm	.114	.038	.640
4.	not afraid	-.095	.218	.579
15.	neat	-.116	.384	.560
7.	human	.109	.184	.541
1.	nature	.135	-.146	.524
20.	familiar	.343	.290	.400

Table 2. Results of factor analysis (female).

		I	II	III	IV
7.	nature	.895	.135	-.002	-.231
1.	not afraid	.878	-.185	-.102	.051
4.	familiar	.869	.248	-.042	-.158
20.	bright	.805	-.084	.059	.122
6.	healthy	.614	-.052	.266	.091
11.	fresh	.593	.142	.261	.116
14.	ambitious	.475	.409	-.038	.097
13.	smart	-.306	.879	.348	.086
9.	cleanliness	-.091	.872	.100	.156
15.	feminine	.260	.674	-.180	-.117
19.	positive	.245	.454	-.226	.150
18.	strong	.303	.447	.021	.184
10.	warm	-.097	.092	.790	-.213
3.	honesty	.173	-.200	.581	.312
8.	aesthetic	.177	.257	.496	-.162
2.	impressive	.211	-.128	.121	.741
12.	preferable	-.371	.266	-.225	.596
17.	elegant	.370	.260	-.056	.576
16.		-.114	.359	-.095	.516

3.4 Survey II analysis and results

First, a factor analysis⁴ was performed using the main factor method in order to determine the elements of the impressions using 20 adjective pairs. In the case of the male average face, a three-factor structure was used, with the first factor being “male,” the second factor being “cleanliness,” and the third factor being “warmth.”

In the case of the female average face, a four-factor structure was used. The first factor was “natural,” the second factor was “intelligence,” the third factor was “capital force,” and the fourth factor was “elegance.”

Second, to find out how the multiple factors that were revealed by the factor analysis affected the impressions made by the facial features and how the impressions made by individual facial features influenced the overall impression, a distributed structure analysis⁵ was performed.

⁴ Using "IBM SPSS Statistics

⁵ Using "IBM SPSS Amos

			Estimated value
masculinity	→	Eyes	.61 *
masculinity	→	Eyes and nose	.38 *
masculinity	↔	warmth	-.43 †
cleanliness	→	Eyes and nose	.81 ***
cleanliness	↔	warmth	.51 †
warmth	→	Eyes	.81 ***
warmth	→	Jaw	.53 **
warmth	→	Eyes and jaw	.53 **
Eye	→	Whole face	.54 ***
Jaw	→	Whole face	.19
Eyes and nose	→	Whole face	.01
Nose and jaw	→	Whole face	.05
Eyes and jaw	→	Whole face	.22

*** : p<.001 ** : p<.010 * : p<.050 † : p<.100

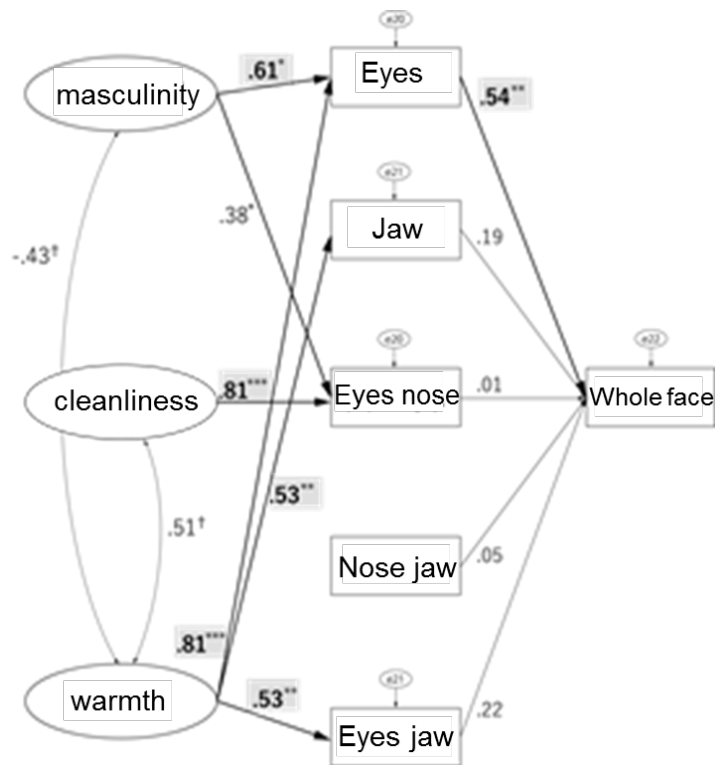


Figure 5. Covariance structure analysis results (male).

		Estimated value
natural	→ Nose and	.50 *
natural	→ intelligence	.50 *
intelligence	→ elegance	.61 †
inclusion	→ Eyes and jaw	.52 *
Eyes	→ Whole face	.74 ***
Jaw	→ Whole face	.25 **
Eyes and nose	→ Whole face	-.04
Nose and jaw	→ Whole face	-.36 ***
Eyes and jaw	→ Whole face	.08

*** : p<.001 ** : p<.010 * : p<.050 † : p<.100

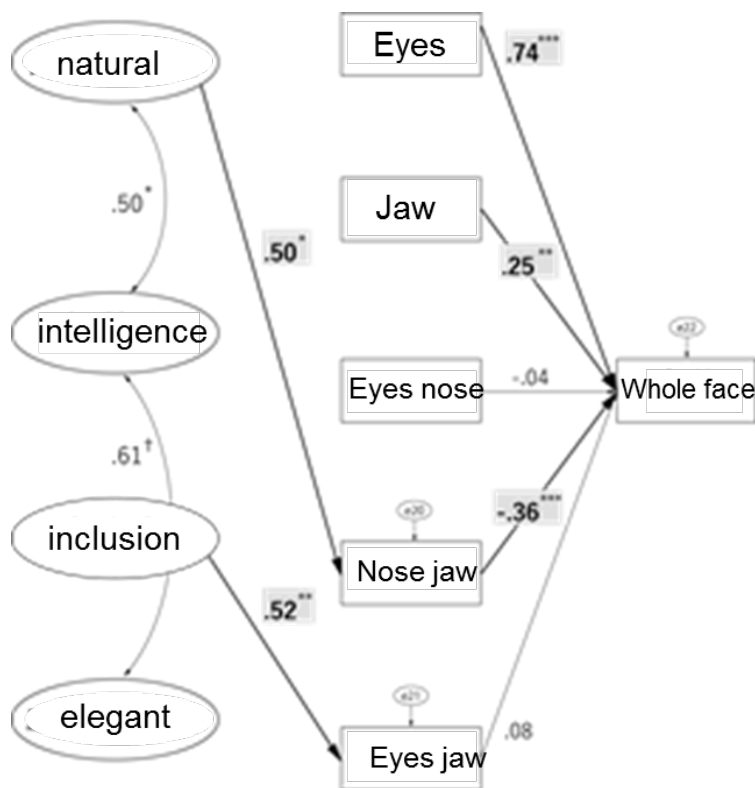


Figure 6. Covariance structure analysis result (female).

As a result of the distributed structure analysis, in the case of the male face, the eyes gave the impression of manliness and warmth, and both the eyes and nose gave the impression of cleanliness. In the case of the female face, the nose gave the impression of cleanliness. It also became clear that naturalness arose from processing to the jaw, and an impression related to tolerance was observed from both the eyes and jaw. In addition, it was suggested that eyes or jaw affected the overall impression of both men's and women's faces. This supports the results from Study I.

4. Conclusion and discussion

Forming impressions of a processed face is largely related to the processing applied to the eyes and jaw, and it is possible to give a specific impression by applying the appropriate processing to those facial features. However, if the processing is overdone, then a decline in interpersonal impressions is inevitable.

Today, if an individual uses an SNS, they can publish photos of their own faces to strangers. People care about what others think so much that they feel they must rely on processing. As a result, the majority of faces are aggregated into the same category of "cute", even to the extent where it feels weird. Therefore, it is expected that in the future, processing that matches the face, purpose, and scene will be possible with the help of this research.

5. Unresolved and Future Prospects

(1) Construct and analyze highly accurate hypothesis verification models.

In Survey II of this study, a complete hypothesis verification model has not been created. In the future, it is desirable to prepare a sufficient number of samples and reconstruct this further verification model.

(2) Confirm that the logic of this research is correct.

From this research, the part of the face that affects the impression of the whole face, the optimal processing and the impression became clear.

However, no complete causality verification has been obtained.

In the future, it is necessary to verify more specific impressions by adding various processes.

(3) Research the psychology hidden in the act of face processing

In this study, we dealt with impressions based on face processing.

However, it is necessary to study the internal issues such as why young people do face photo processing.

6. References

- Harashima, H. (1998) *Invited to face science*. Iwanami Science Library book
Ikeda, S. (1987) *On identification of human face or expression*. Kansai University Press.book
Inoue, S., Yamamoto, M., & Yamazaki, K. (2000). Development of an objective evaluation technology for facial form impressions. https://www.jstage.jst.go.jp/article/sccj/1979/34/3/34_3_249/pdf/-char/en Japan Cosmetics Engineer Journal / 34 (2000) 4

- Kato, T., Aoki, S., Shinohara, T., Murakami, T., & Miyazaki, M. (2015). The effect of eye and eyebrow spacing on facial impression.
https://www.jstage.jst.go.jp/article/jjske/14/3/14_TJSKE-D-15-00004/pdf
 Japan Society of Kansei Engineering Journal Vol14 No3 419-424
- Kubo, Y. (2015). Future prospects for technologies supporting improving the attractiveness of women's faces. https://www.jstage.jst.go.jp/article/itej/69/11/69_853/pdf-char/en
 Journal of the Institute of Image Information and Television Engineers Vol 69 No 8
- MMD labo Co., Ltd. (2016). *Survey on use of camera application*.
 Academic research report of MMD labo research
- Noriko, K., & Isamu, S. (2014) Examination of face impression by difference of face parts arrangement.
http://repository.ris.ac.jp/dspace/bitstream/11266/5596/1/nenpo06_p035_kushima_et_al.pdf Journal of the Psychological Research in Risho University
- Oshio, S. (2004) *Spiritism and survey data analysis by SPSS and Amos*. Tokyo Book book.
- Otsuka, S. (2013). *From face morphology to life morphology to art*. Shueisha Shinsho book
- Satoshi, S., Keishi, K., Naokazu, A., & Hiroyuki, K. (2009). *The influence of brightness and contrast of facial photographs on impression formation*.
https://www.jstage.jst.go.jp/article/itej/63/11/63_11_1637/pdf-char/en
 Journal of the Institute of Image Information and Television Engineers Vol 63 No 11
- Shibata, H., & Higuchi, R. (2013) On the effects of face attraction and various factors: focusing on cute and beautiful.
<https://repository.kulib.kyotou.ac.jp/dspace/bitstream/kn178101/1/VISION250202.pdf>
 Kyoto University Academic Information Repository VISION 2013 25 2
- Hishida H.; Higuchi. (2013) The effects of face attraction and factors: Cute and beautiful<Commentary> in the heart
<http://hdl.handle.net/kn178101>
 Citation VISION (2013), 25 (2): 95-99 Issue Date 2013-04
 The Japanese Visual Society Type Journal Article Textversion publisher
- Ishibashi, A., Tanabe, M., Takahashi, M., Katsuhara, K., Kuraguchi, K. and Ashida H.:
 For female eyes only: comparing the effects of enlarging eyes and irises on facial attractiveness.
 Poster presented at the Cognitive Science Society 2012, Aug 4, 2012, Sapporo, Japan.
- Yamamoto, Y. (2000). Face impression and interpersonal influence.
https://www.jstage.jst.go.jp/article/sccj/1979/34/4/34_4_351/pdf
 Japan Cosmetics Engineer Journal / 34 (2000) 3
- G. Rhodes, L. A. Zebrowitz, A. Clark, S. M. Kalick, A. Hightower and R. Mckay:
 Do facial averageness and symmetry signal health? *Evolution and Human Behavior*, 22, 31–46, 2001.
- T. R. Alley and M. R. Cunningham: Averaged faces are attractive, but very attractive faces are not average. *Psychological Science*, 2, 123–125, 1991
- J. H. Langlois and L. A. Roggman: Attractive faces are only average. *Psychological Science*, 1, 115–121, 1990.

Agu Naoto: Kyoto Institute of Technology. Engaged in research on the communication design of information devices.

Kubo Masayoshi: Professor Emeritus, Kyoto Institute of Technology.
 Professor Osaka University of Art.
 Specializes in inclusive design. Engaged in research on the communication design of information devices and haptics.