

## **Mandom has discovered that the impression of “cleanliness” in young men is closely related to their skin state**

Mandom Corporation (headquarters: Osaka City, President & CEO: Motonobu Nishimura; hereinafter referred to as “Mandom”) has been engaging in research on the impression of the skin to provide skincare products that improve the impression of one’s appearance.

To date, our research has shown that the “impression of youthfulness” in middle-aged men is affected by brightness of skin, with skincare improving the skin’s appearance. A viewer’s impression may therefore be affected by this factor. Interestingly, we found that a viewer uses the cheeks of subjects to give their impression of the subject’s youthfulness.

In this study, we examined the relationship between facial appearance of a young man and the appearance of his skin. Of the numerous items that influence one’s impression of another individual’s face, a viewer’s impression of “cleanliness” was found to closely relate to the appearance of the skin (how good or bad the apparent condition of the skin is). Aligning with our previous results, viewers were mainly focused on the cheek and forehead than any of the other facial impression items when they assessed the young man’s “cleanliness”. Among the characteristics of skin appearance as evaluated by a specialist panel (\*1), irregularity in skin, pores and skin color was closely related to cleanliness. In addition, when these parameters were set to good/bad conditions, the impression of “cleanliness” was significantly higher when the condition of the skin was good than bad.

The results of this research were presented at the 23<sup>rd</sup> JFACE Annual Conference (Forum Kaogaku 2018) held between September 1 and 2, 2018.

### **1. For the impression of a young man’s face, “cleanliness” is closely related to skin state**

Photographs of 55 young men (16 to 29 years old) under the same conditions were taken and used to create facial images where background/hairstyle information was removed. These facial images were then presented to 35 third-person men and women (age, 20+ to 40+) who were asked to evaluate 13 facial impression items (“cleanliness”, “sincere” etc.) and 11 items reflecting skin status (“appears transparent”, “appears smooth” etc.) for each facial image; this was performed according to the VAS method (\*2) to derive a mutual correlation. Among the facial impression items examined, “cleanliness” was observed to correlate with many of the items for the appearance of skin [Table 1].

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**2. Focusing on cheeks and forehead to evaluate “cleanliness”**

To elucidate the region of the face that viewers use to evaluate “cleanliness”, we used an eye-tracker (\*3) and measured the gaze of 20 viewers (men and women; age, 20+ to 40+) who were analyzing 55 facial images of young men as described above.

For the impression items “sincere” and “seems easy to talk to,” viewers focused on eyes and nose for a shorter period of time than forehead and cheeks [Figures 1 and 2]. Since cleanliness is closely related to the appearance of the skin, we can deduce that viewers determine “cleanliness” by focusing on the cheeks and forehead which are regions where the appearance of an individual’s skin is evident.

**3. “Unevenness”, “pores” and “skin color (brightness/irregularity)” are important contributors to the improvement of the impression of “cleanliness”**

To examine the type of characteristics associated with “cleanliness” of skin, a specialist panel (\*1) was employed to perform a visual examination of the skin. We found that the impression score of cleanliness highly correlated with unevenness, pores and skin color (brightness and irregularity), instead of facial hair and acne [Table 2]. Therefore, using the five features, “non-smooth skin”, “uneven skin”, “conspicuous pores”, “brightness of skin” and “irregularity in skin color,” we combined the facial images depicting good and bad skin conditions of young men to create 10 image patterns (i.e., same face, different skin conditions) for 30 young men [Figure 3]. We then asked 36 viewers (men and women; age, 20+ to 40+) to give their impression of “cleanliness” using the simulated images. Significantly higher scores were obtained for the simulation images with better skin conditions than with bad skin conditions [Figure 4], suggesting that improving the appearance of the skin would improve the impression of face cleanliness.

Owing to these results, Mandom will continue such studies and will apply all findings to the development of skincare products to improve people’s impression of young men.

\*1 This refers to a panel of five individuals who work in the skincare business and possess a common axis of evaluation. Skin state as evaluated by this specialist panel is considered the “characteristics of skin appearance.”

\*2 Visual Analog Scale: A scale drawn on a straight line, with the left end marked “I think so” and the right end marked “I do not think so”. Upon evaluation, the assessors mark their impression at a point along the straight line.

\*3 Eye-tracker: the line-of-sight analyzer Tobii Pro X2-60 (Tobii Technology) was used.

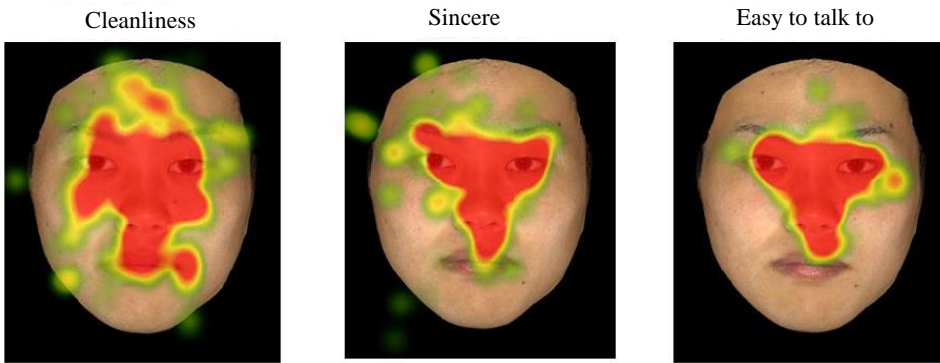
**[Reference Material]**

**Table 1. Correlation coefficient of the facial impression and skin condition item scores as evaluated by the general panel.**

Blue cells indicate a correlation coefficient >0.5.

|                   |                 | Skin condition |                  |                   |            |                    |                   |             |             |          |                   |                  |
|-------------------|-----------------|----------------|------------------|-------------------|------------|--------------------|-------------------|-------------|-------------|----------|-------------------|------------------|
|                   |                 | Rough skin     | Transparent skin | Skin with tension | Shiny skin | Dull color of skin | Even texture skin | Smooth skin | Glossy skin | Dry skin | Conspicuous pores | Conspicuous acne |
| Facial impression | Cleanliness     | -0.58          | 0.76             | 0.81              | -0.17      | -0.68              | 0.76              | 0.77        | 0.78        | -0.70    | -0.65             | -0.40            |
|                   | Sincere         | -0.11          | 0.27             | 0.40              | 0.10       | -0.21              | 0.26              | 0.25        | 0.29        | -0.29    | -0.19             | -0.02            |
|                   | Easy to talk to | -0.09          | 0.30             | 0.42              | 0.23       | -0.26              | 0.26              | 0.26        | 0.37        | -0.38    | -0.17             | 0.05             |

Figure 1. Examples of the focal regions used to evaluate each impression.



Regions in red represent the main areas of focus.

Figure 2. Comparison of the time spent on each site during the evaluation of each impression. Tukey-Kramer method, \*\*: p<0.01; \*: p<0.05.

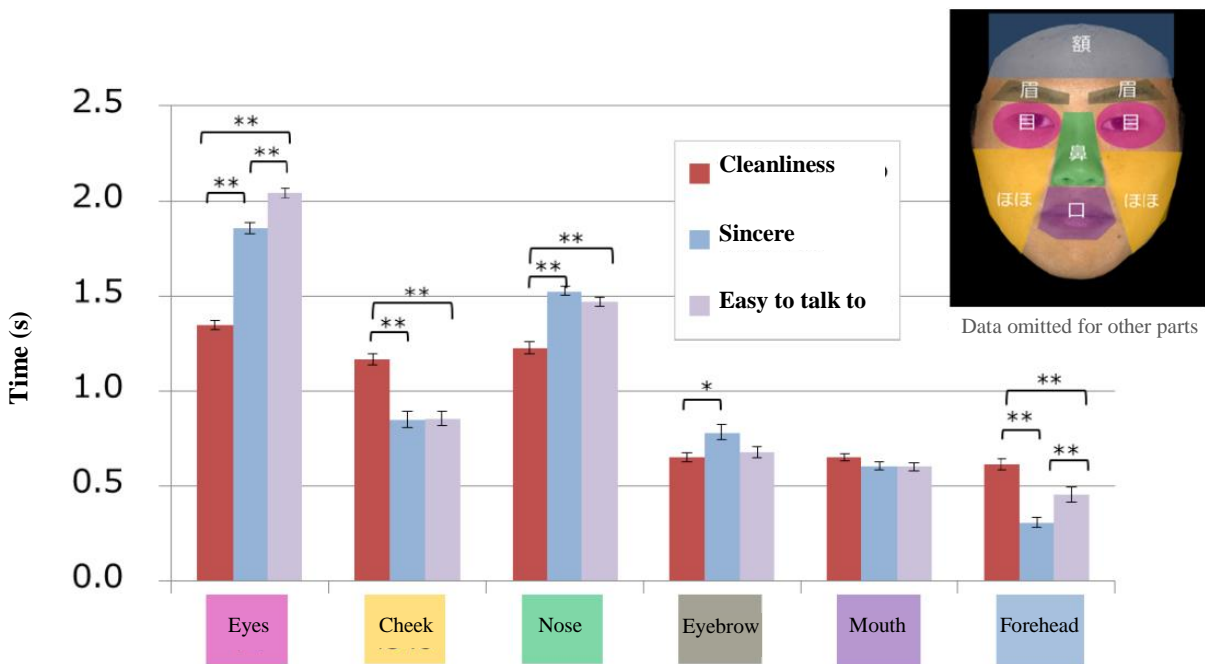
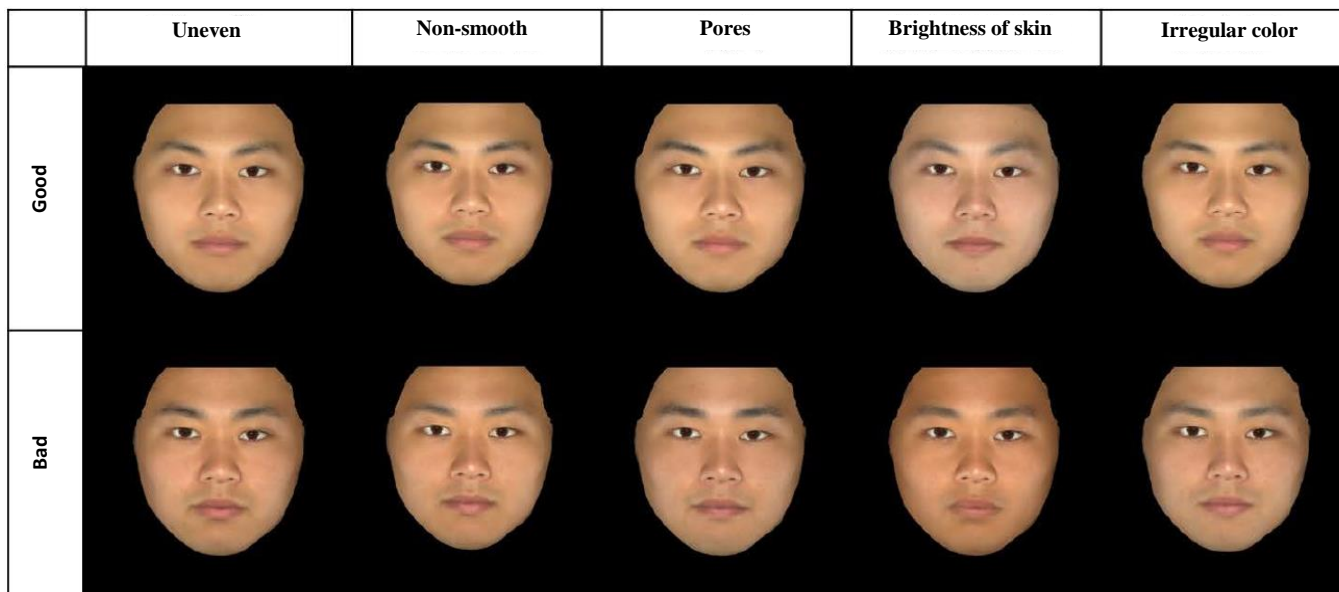


Table 2. Correlation coefficient for cleanliness score and characteristics of skin appearance score as evaluated by the specialist panel.

Blue cells indicate a correlation coefficient >0.5 (descending order from left).

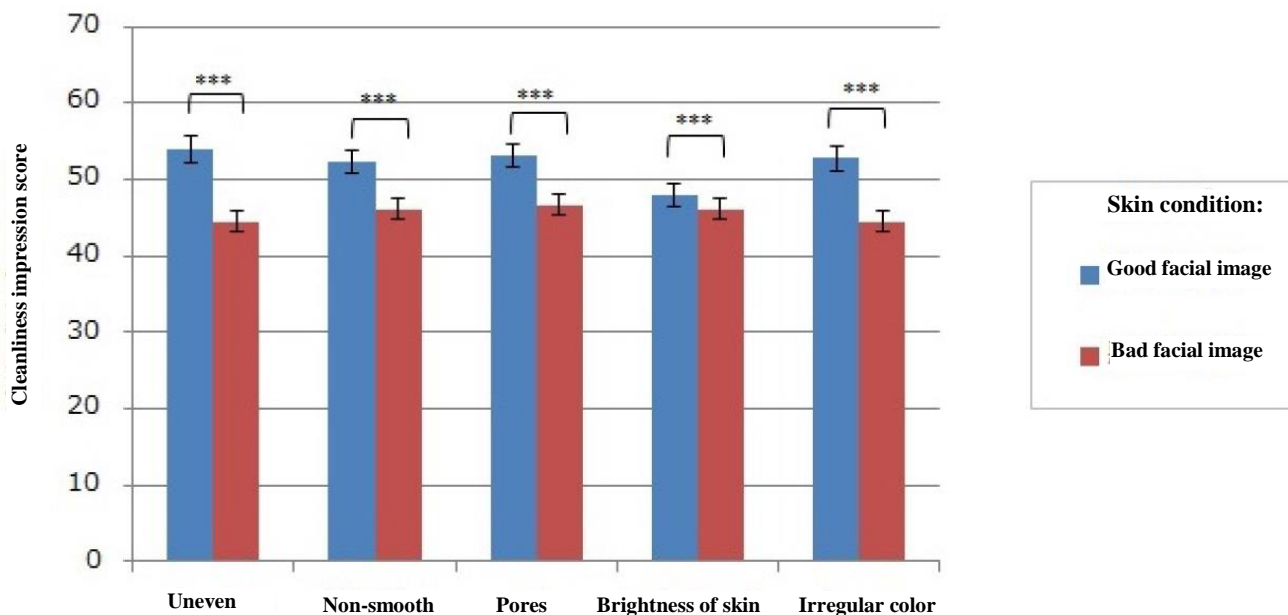
| Characteristics of skin appearance evaluated by a specialist panel |                      |             |                    |                   |                 |                |                        |                    |
|--|----------------------|-------------|--------------------|-------------------|-----------------|----------------|------------------------|--------------------|
| Non-smooth skin  | Irregular skin color | Uneven skin | Brightness of skin | Conspicuous pores | Redness of skin | Amount of acne | Conspicuous razor rash | Yellowness of skin |
| -0.73  | -0.57                | -0.55       | 0.53               | -0.52             | -0.46           | -0.36          | -0.31                  | -0.17              |

**Figure 3. Examples of simulation images where good/bad conditions of skin were combined using the characteristics of skin appearance (examples).**



**Figure 4. Comparison of average cleanliness impression score of simulation images.**

For all characteristics, significant differences were found between good and bad skin conditions (t-test, \*\*\*:  $p < 0.001$ ).



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