Supplementary material

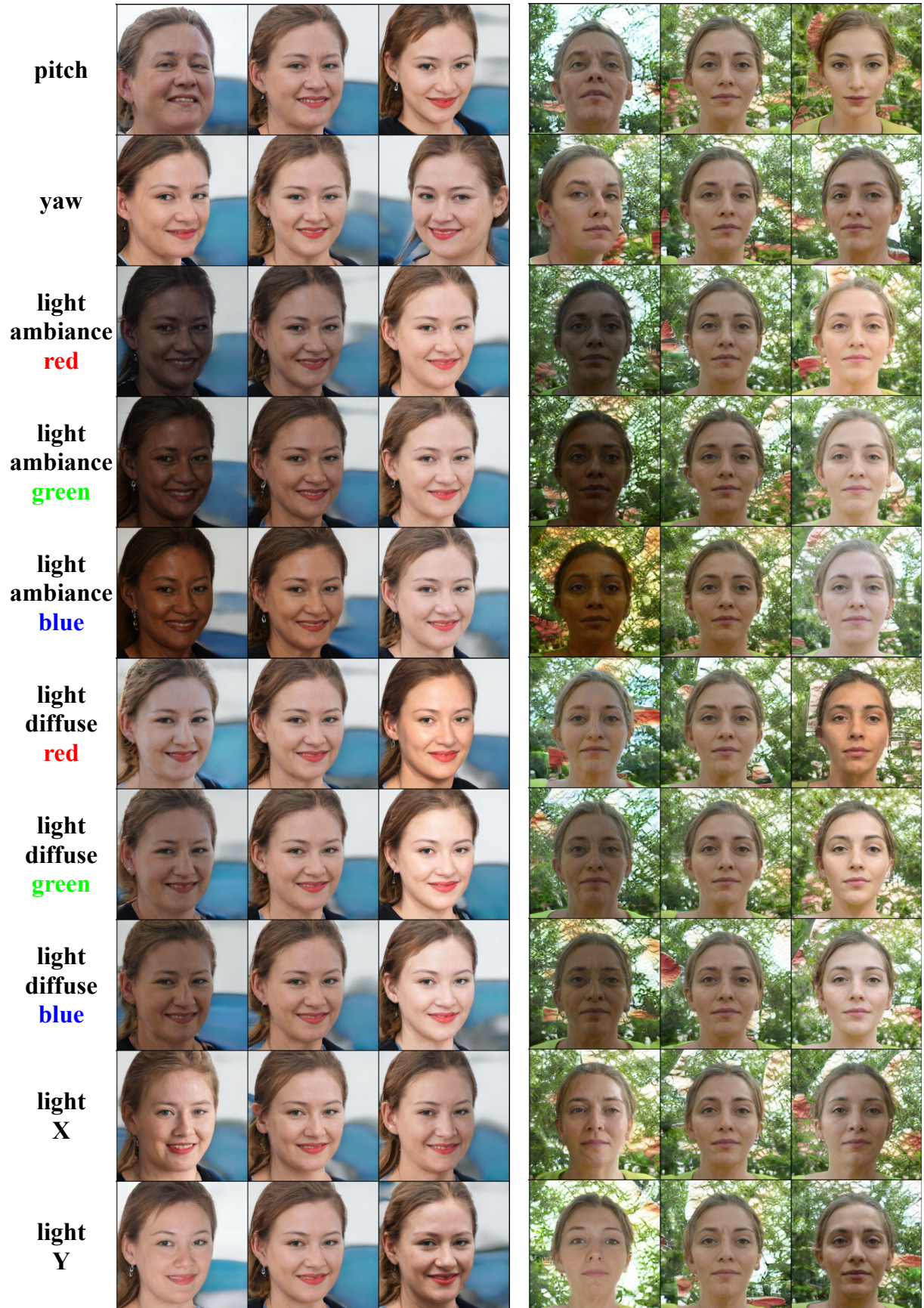## 1 Additional results on univariate semantics
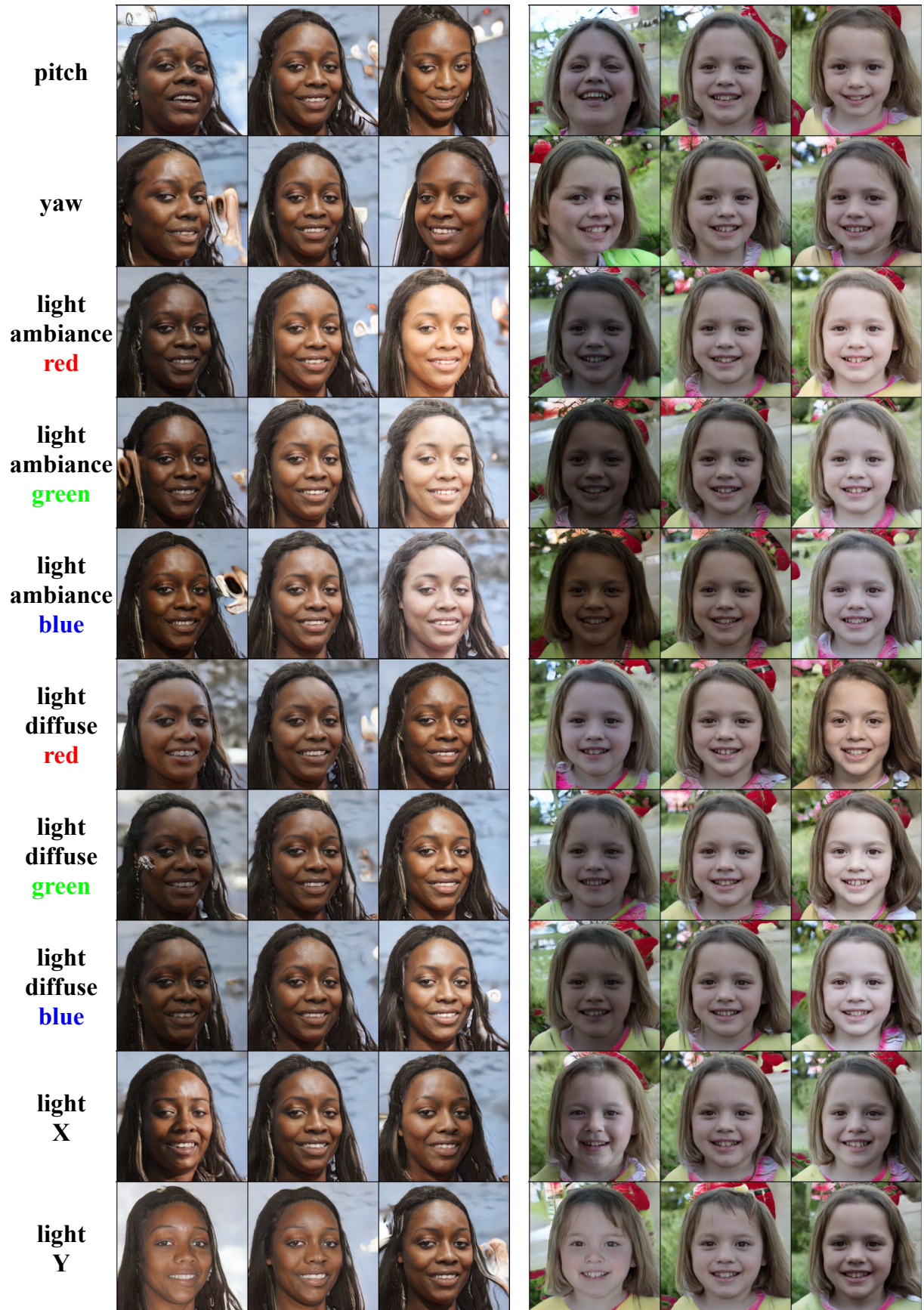

Figure 1: FFHQ samples.

Figure 2: FFHQ samples.
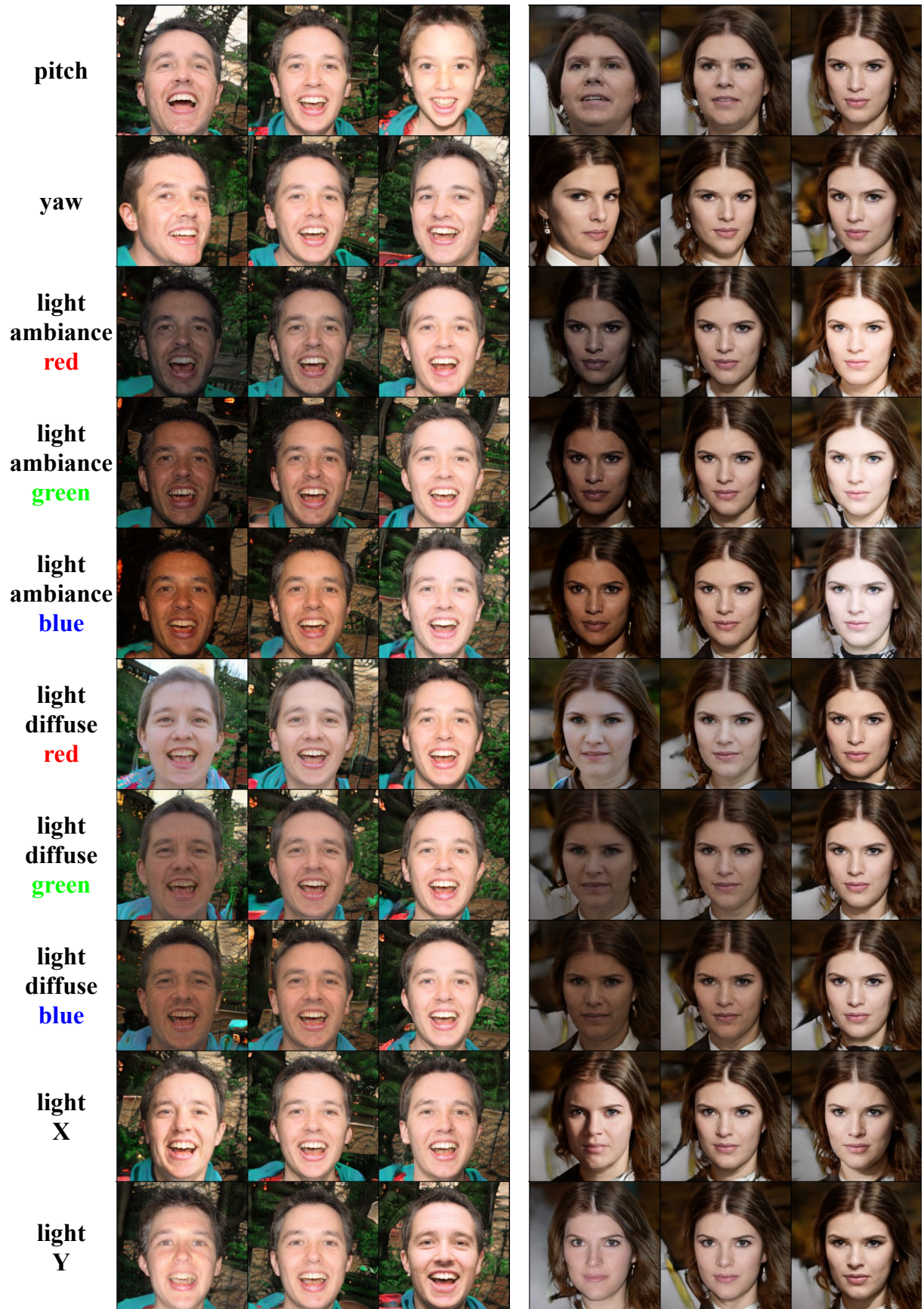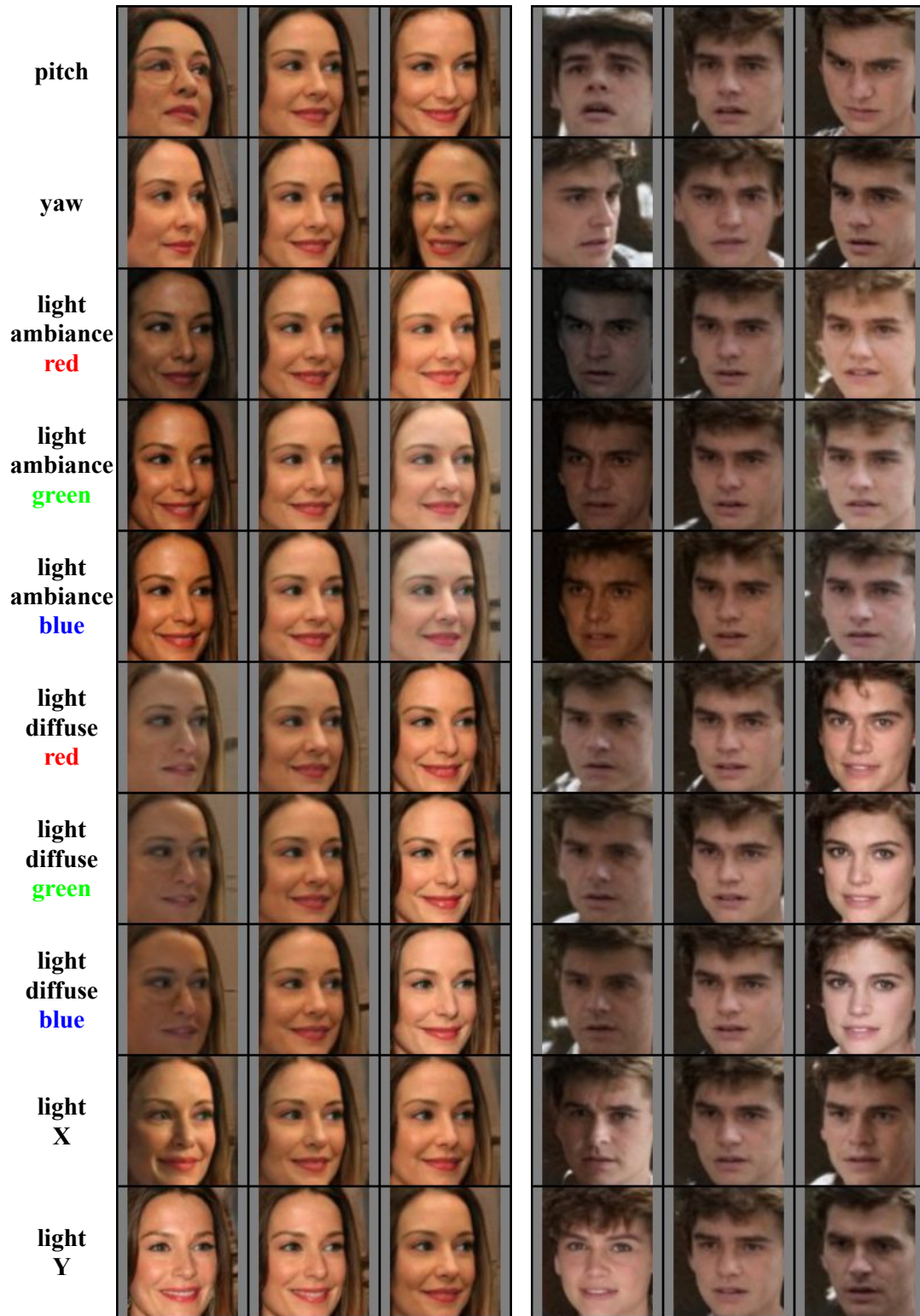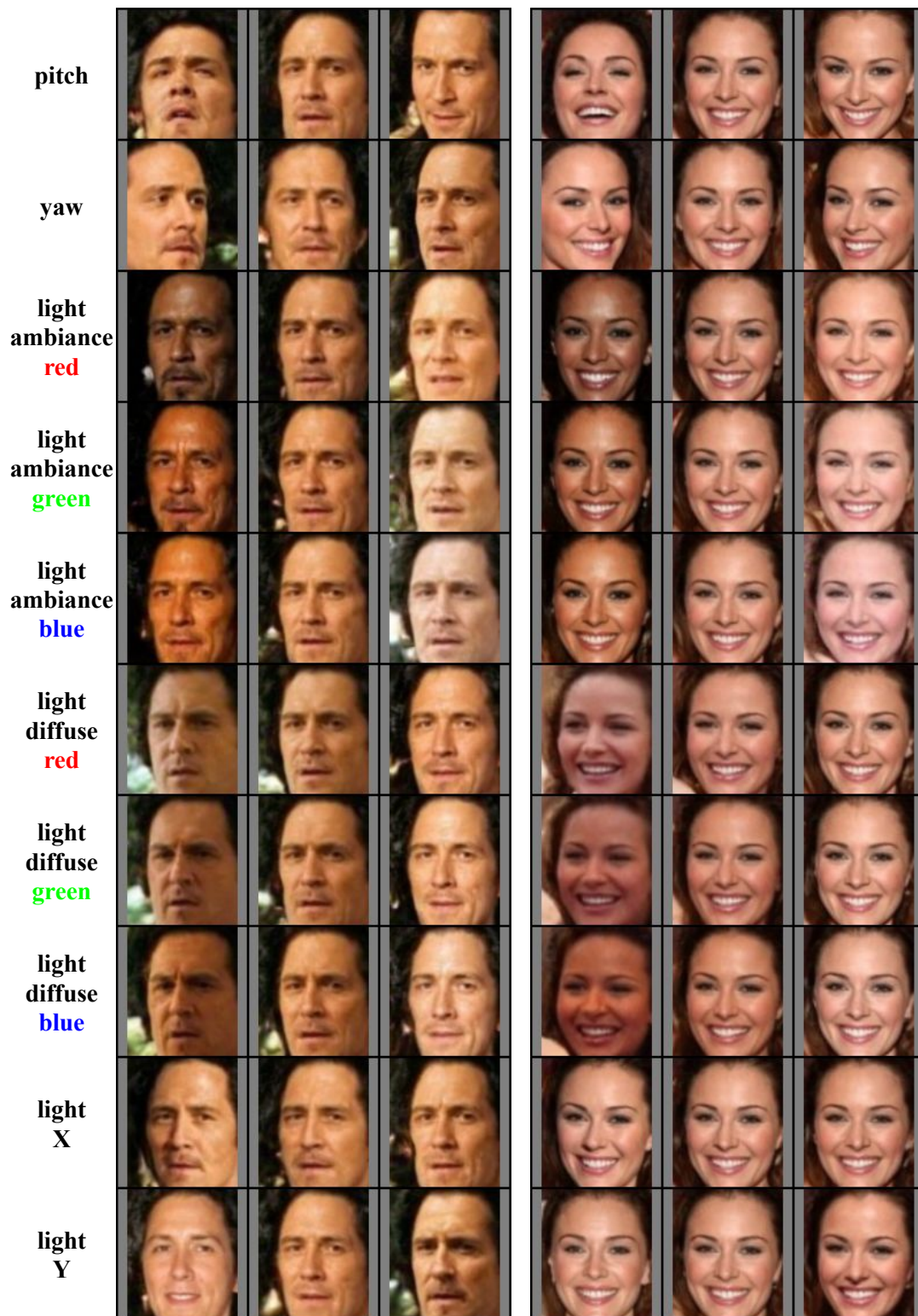
Figure 3: FFHQ samples.

Figure 4: CASIA samples.

Figure 5: CASIA samples.

pitch

yaw

light ambiance red

light ambiance green

light ambiance blue

light diffuse red

light diffuse green

light diffuse blue

light X

light Y

Figure 6: CASIA samples.

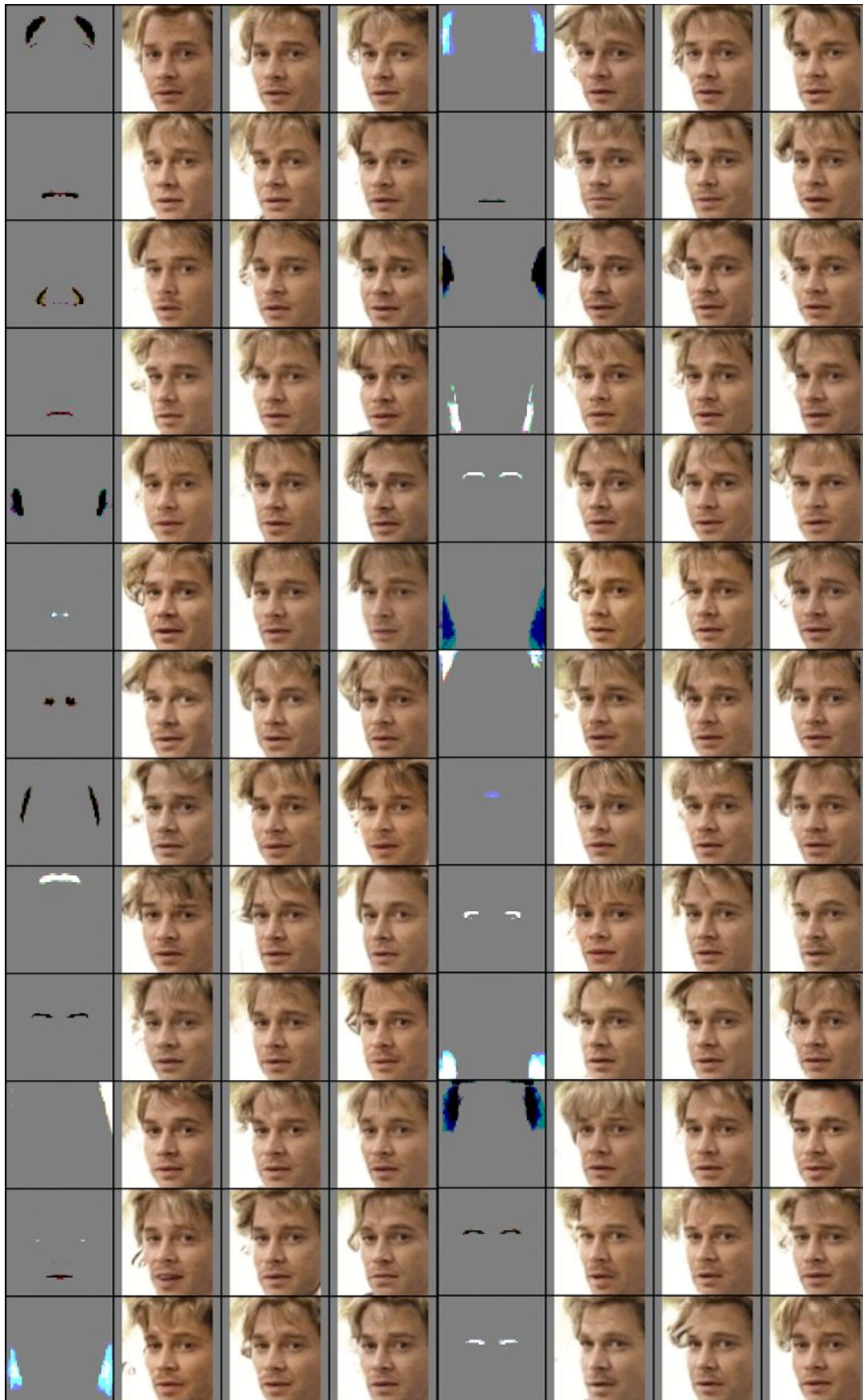# 2 Additional results on canonical semantics manipulation
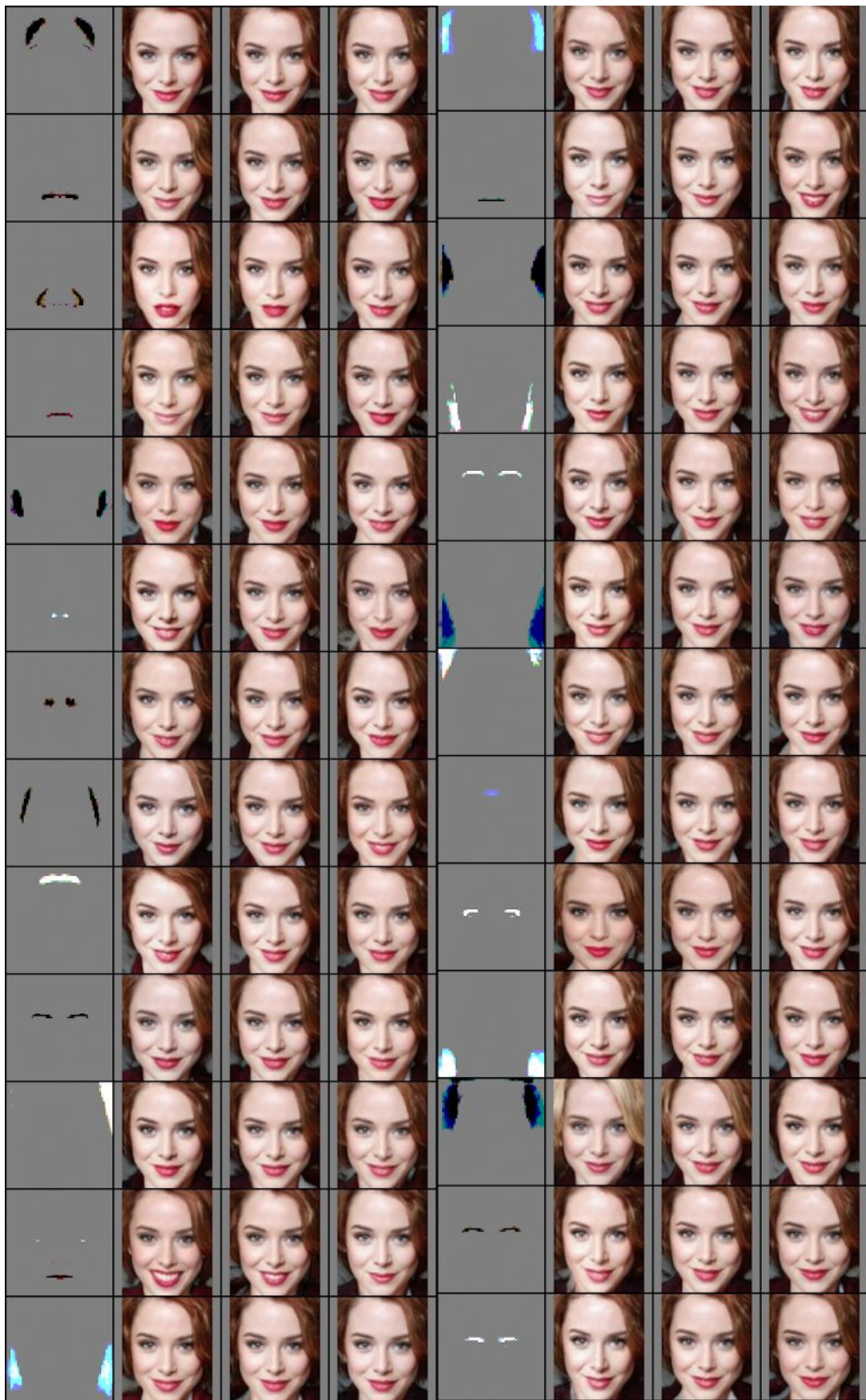

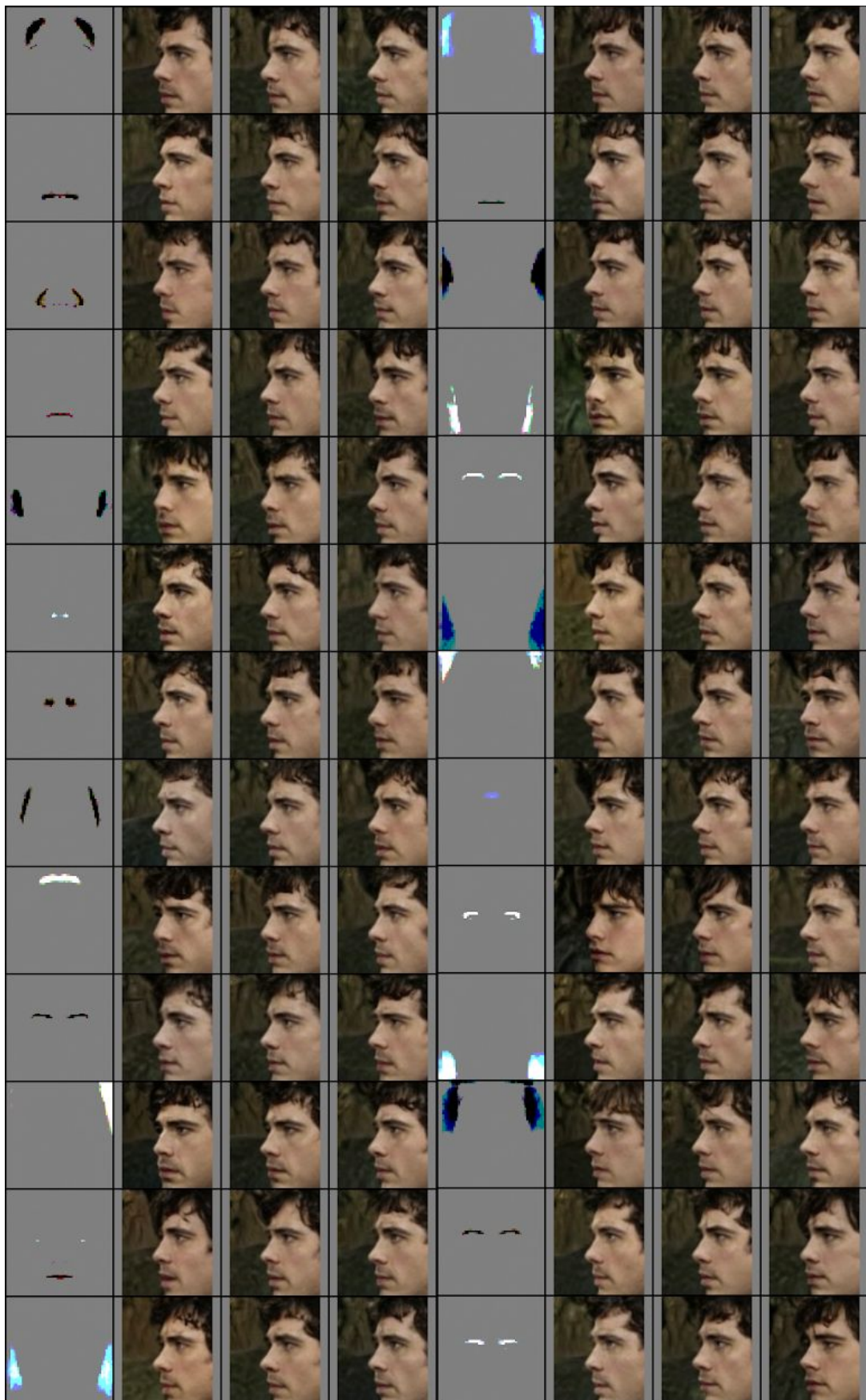Figure 7: CASIA samples.

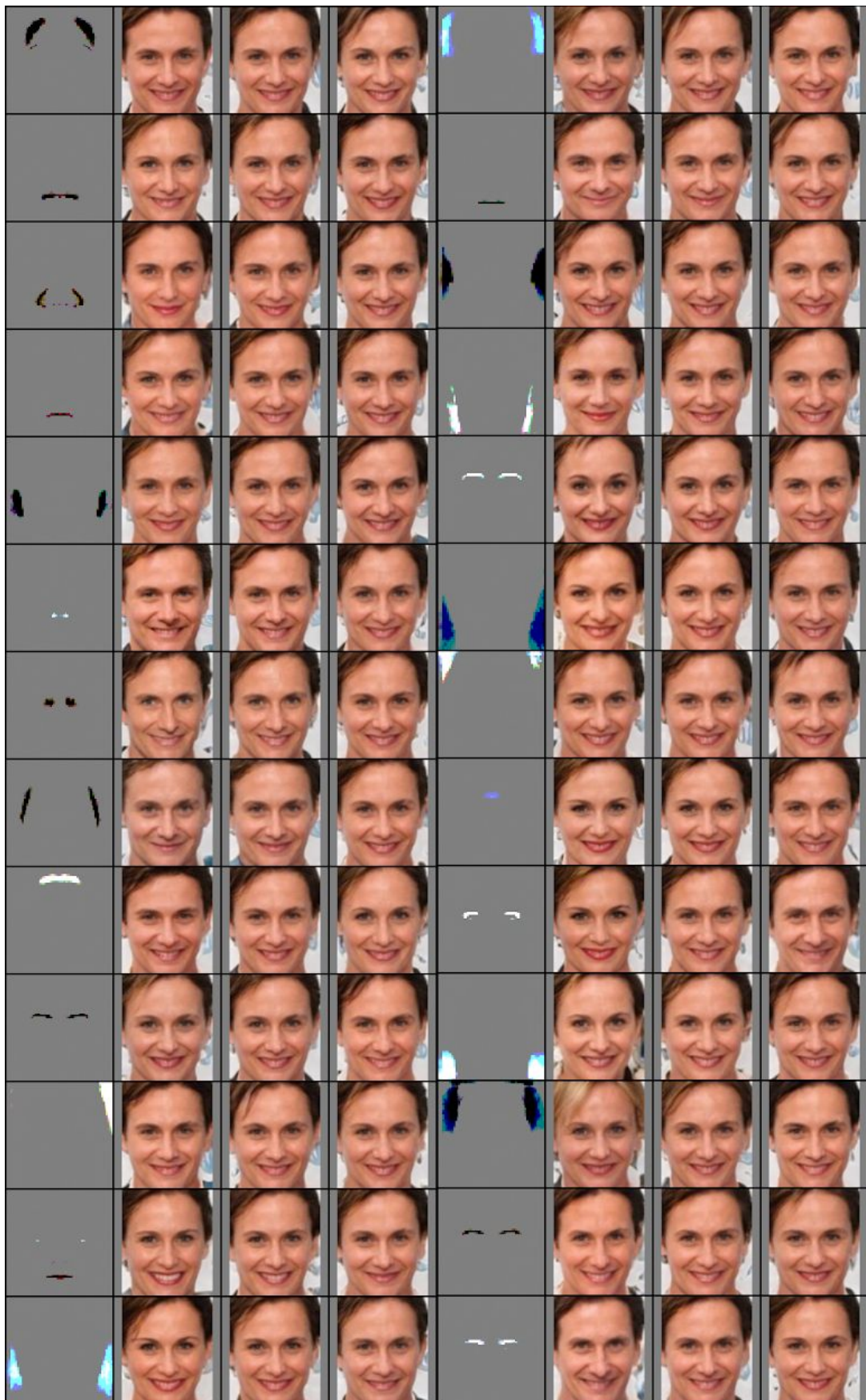Figure 8: CASIA samples.

Figure 9: CASIA samples.
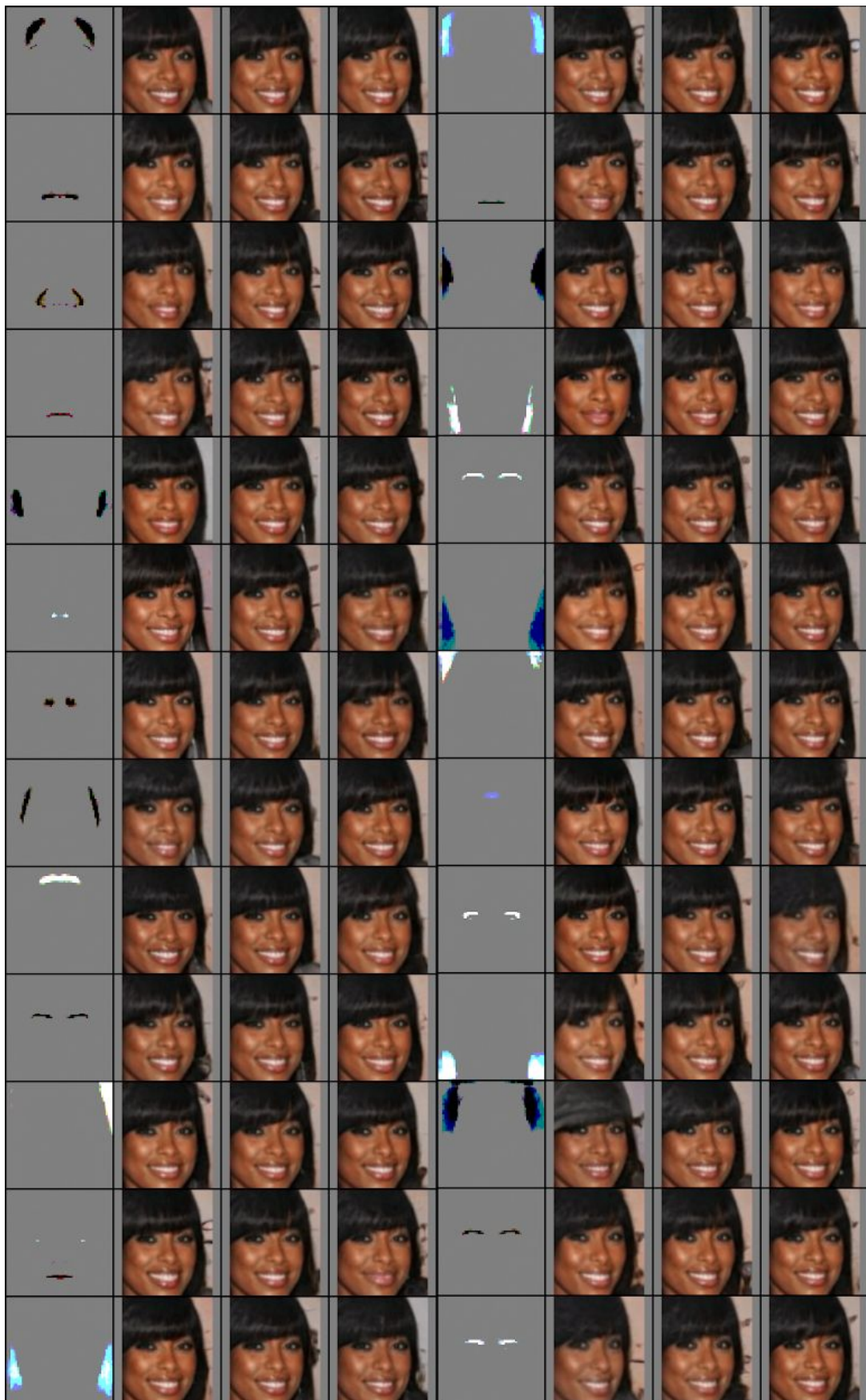
Figure 10: CASIA samples.
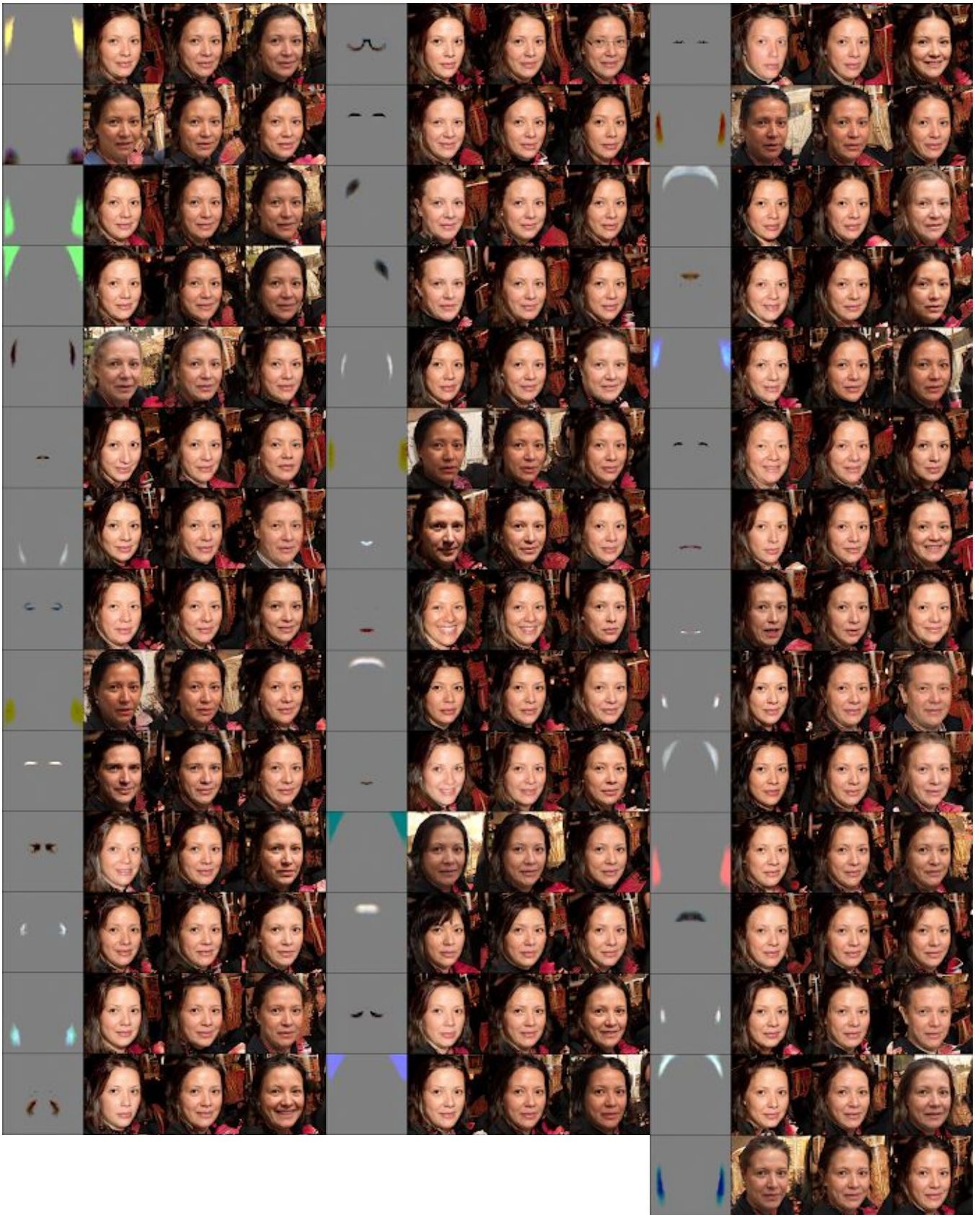
Figure 11: CASIA samples.
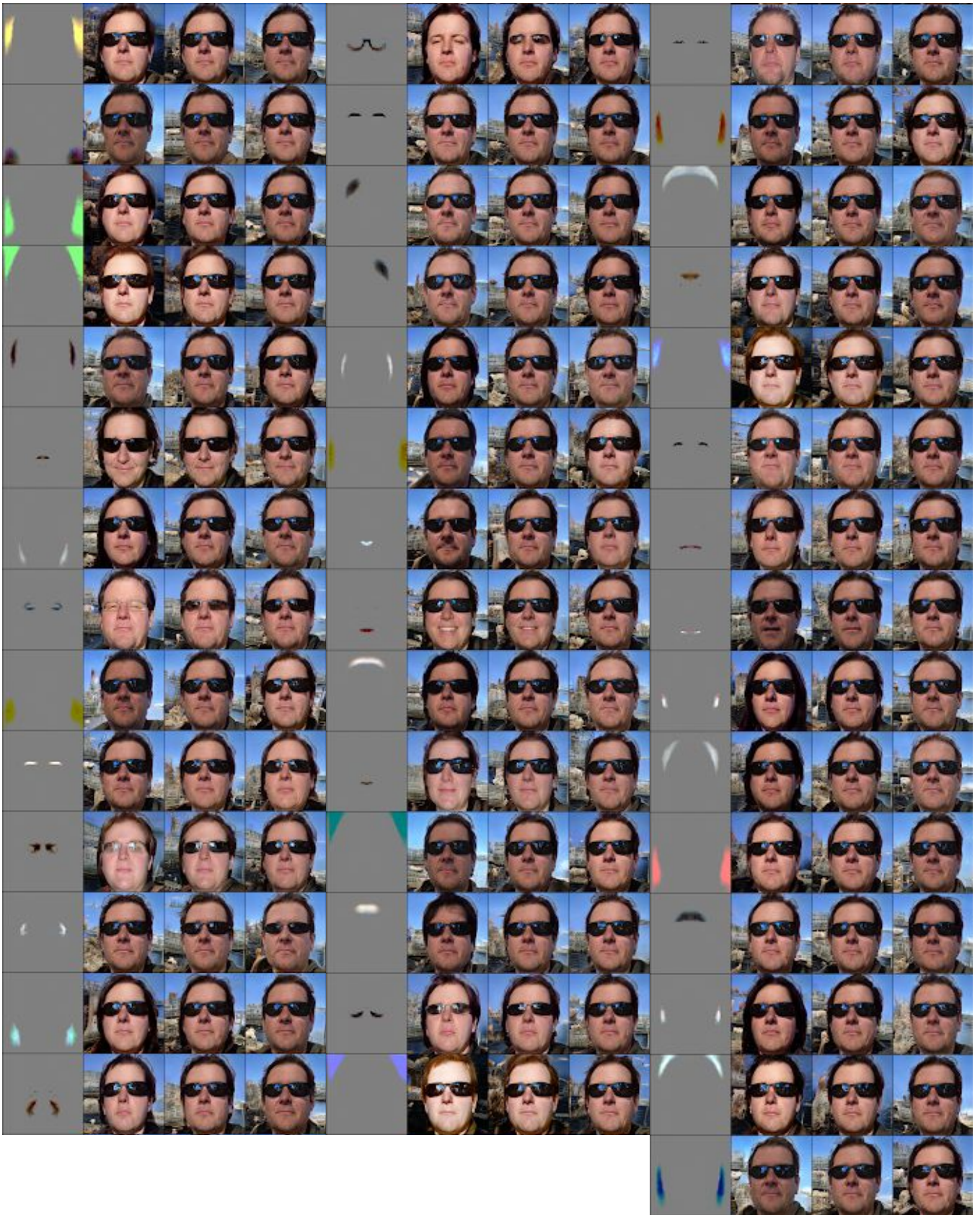
Figure 12: FFHQ samples.
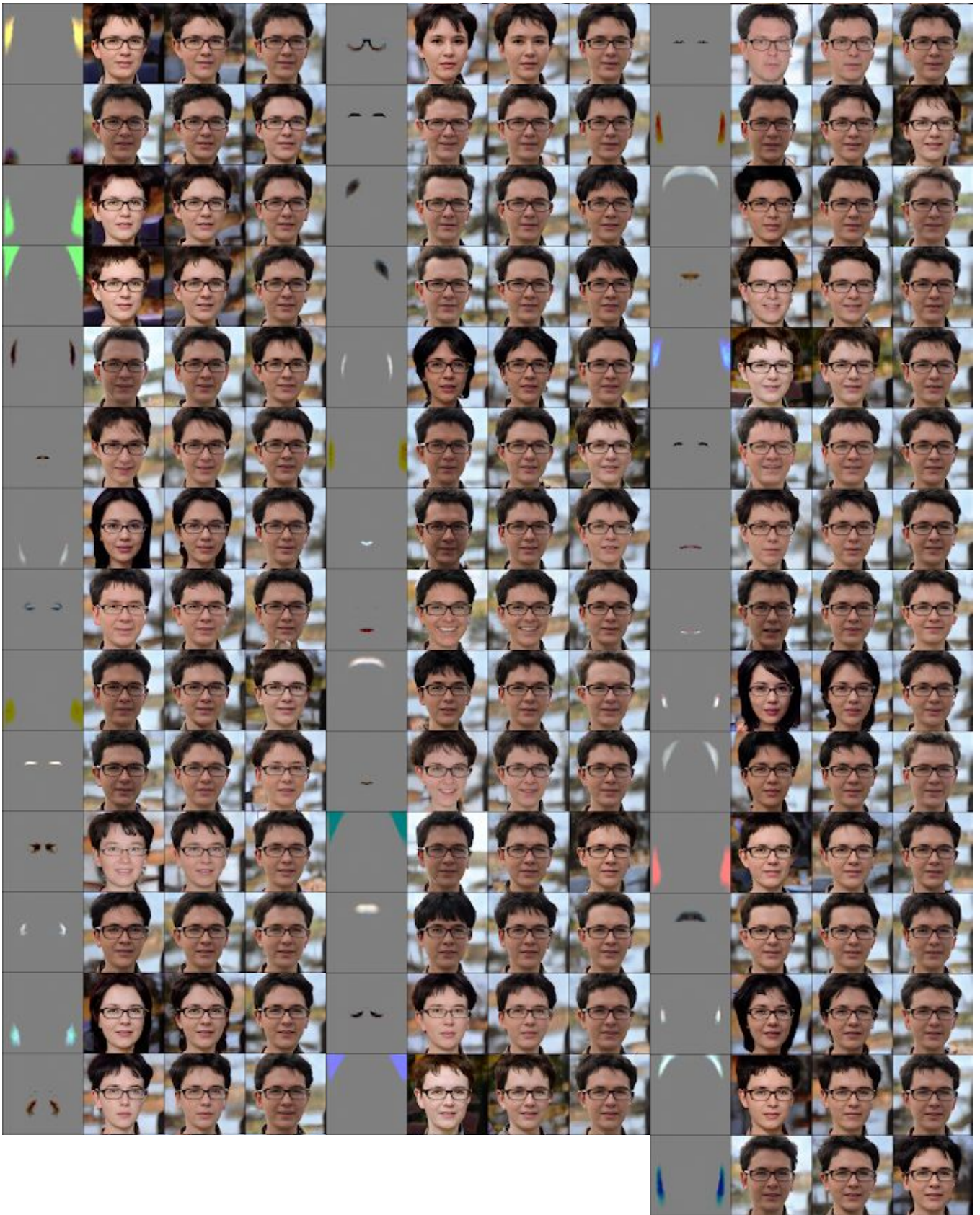
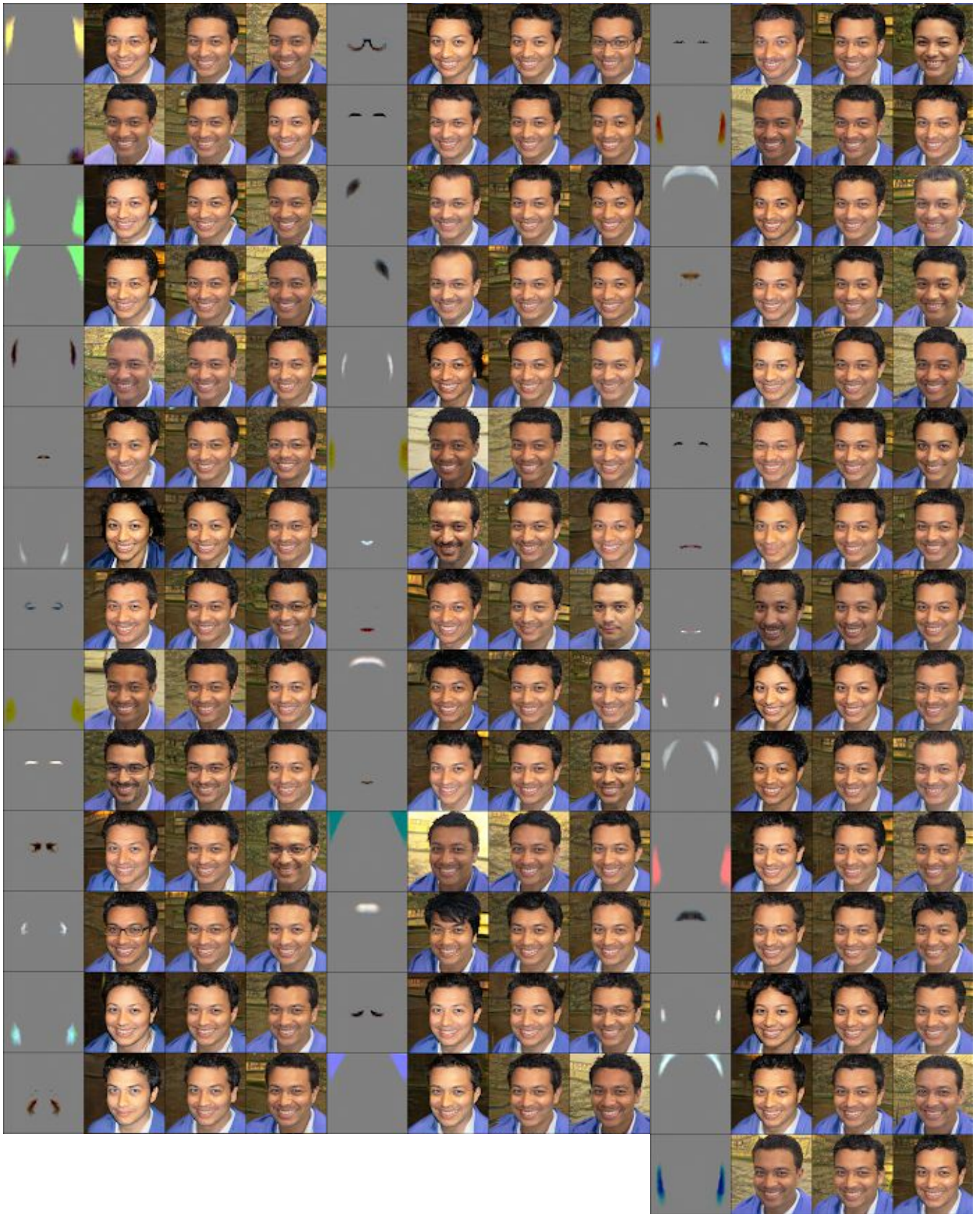Figure 13: FFHQ samples.

Figure 14: FFHQ samples.
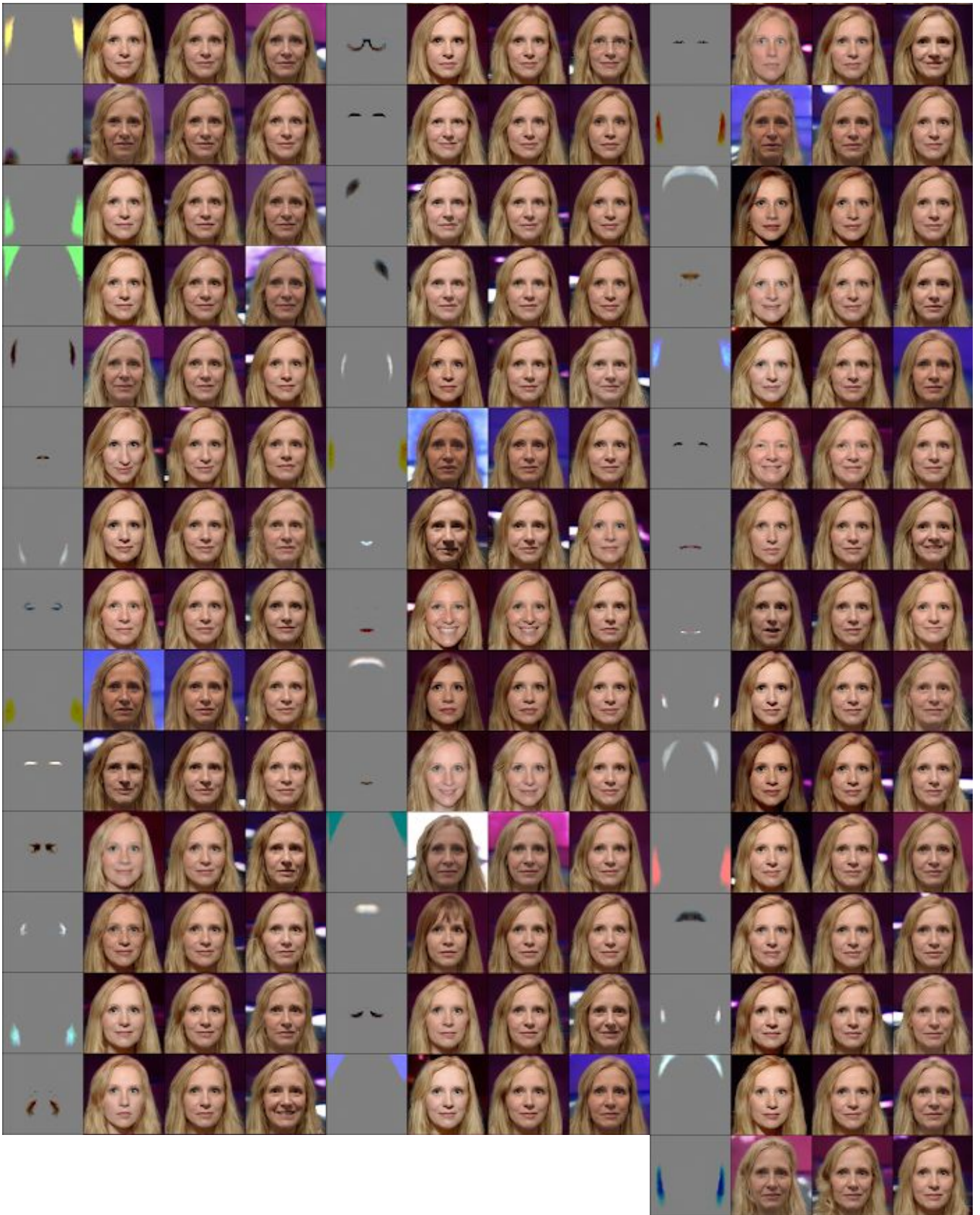
Figure 15: FFHQ samples.

Figure 16: FFHQ samples.

2.1 Changing α value

By increasing α, the number of canonical components decreases and become more sparse. However, they are not necessarily more independent.

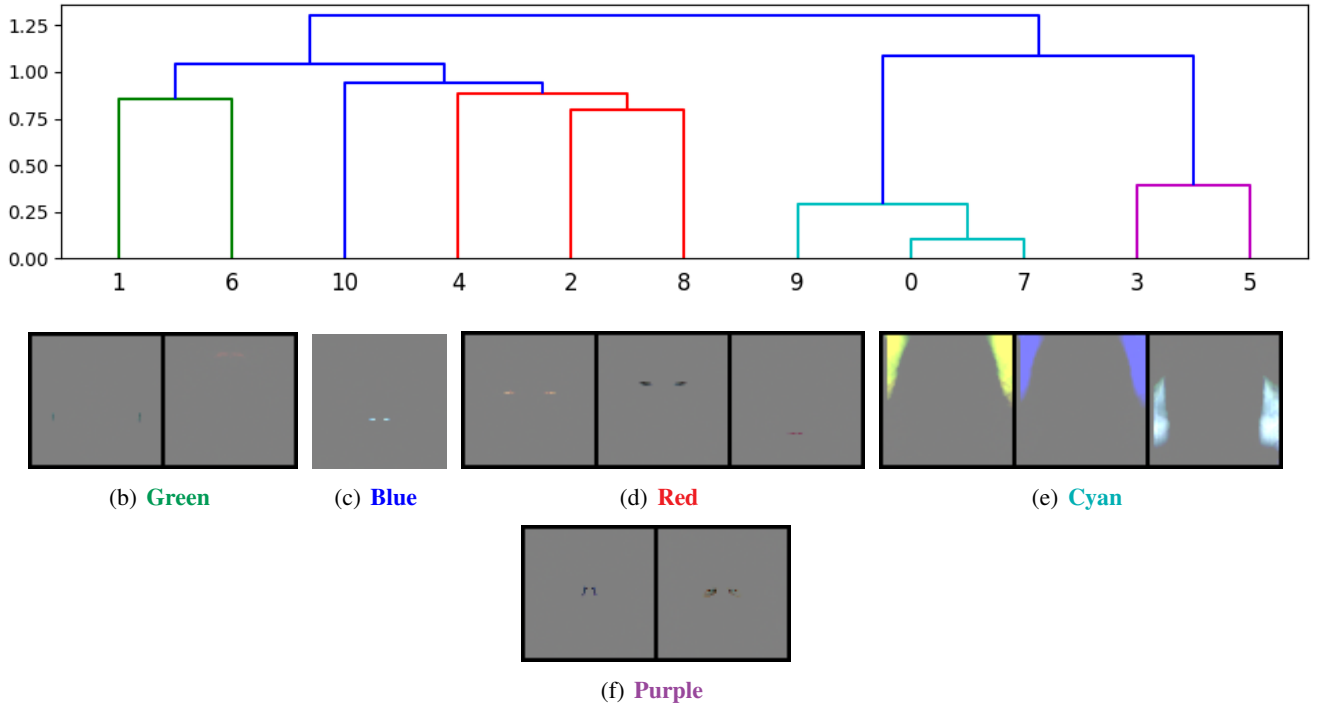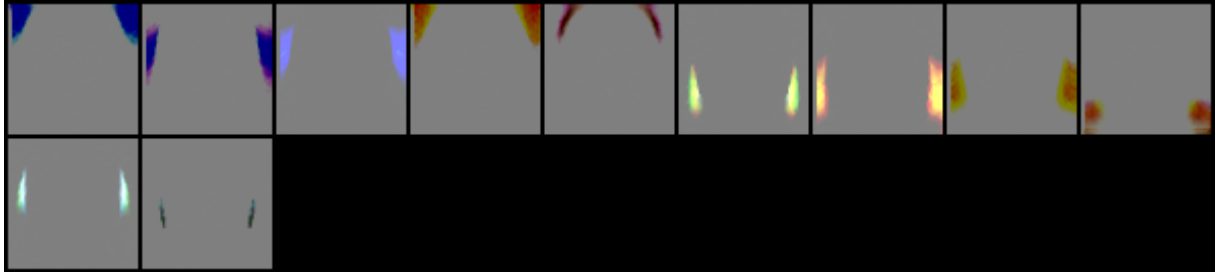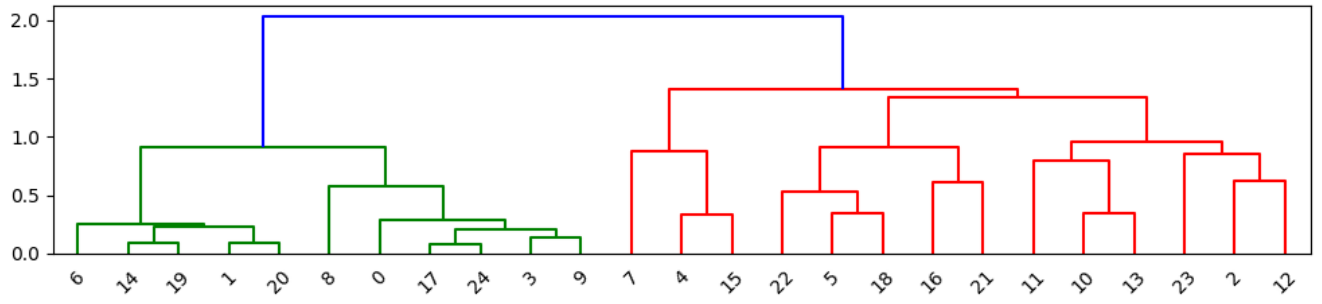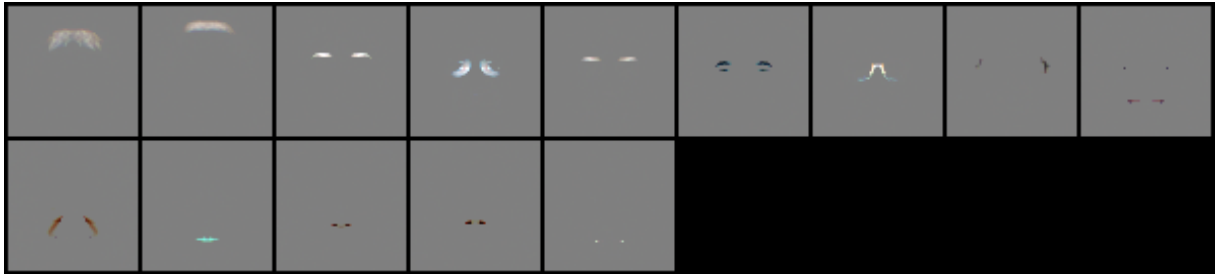(b) **Green** (c) **Blue** (d) **Red** (e) **Cyan**

(f) **Purple**

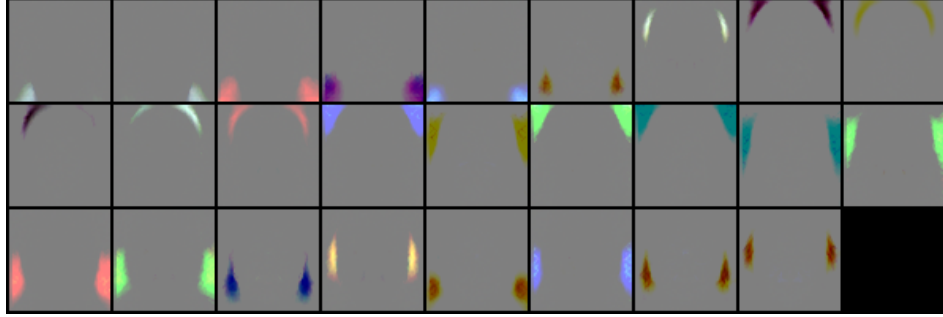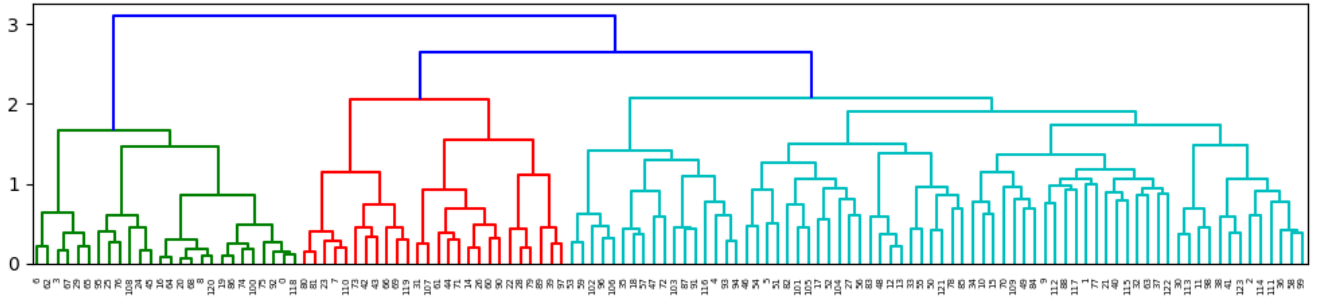Figure 17: Albedo components of FFHQ StyleGAN with $\alpha = 3$, $\beta = 1$.
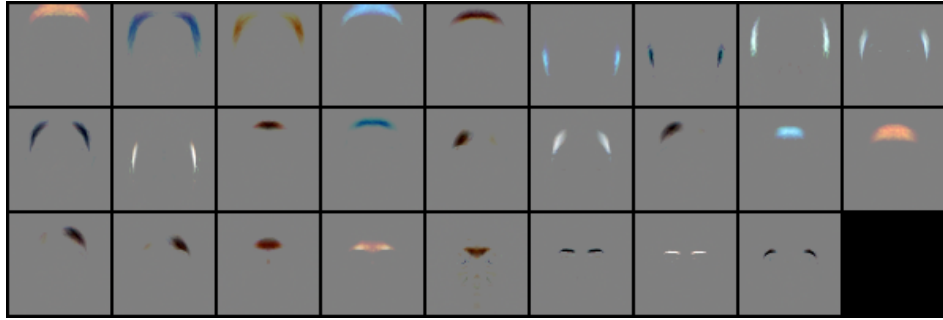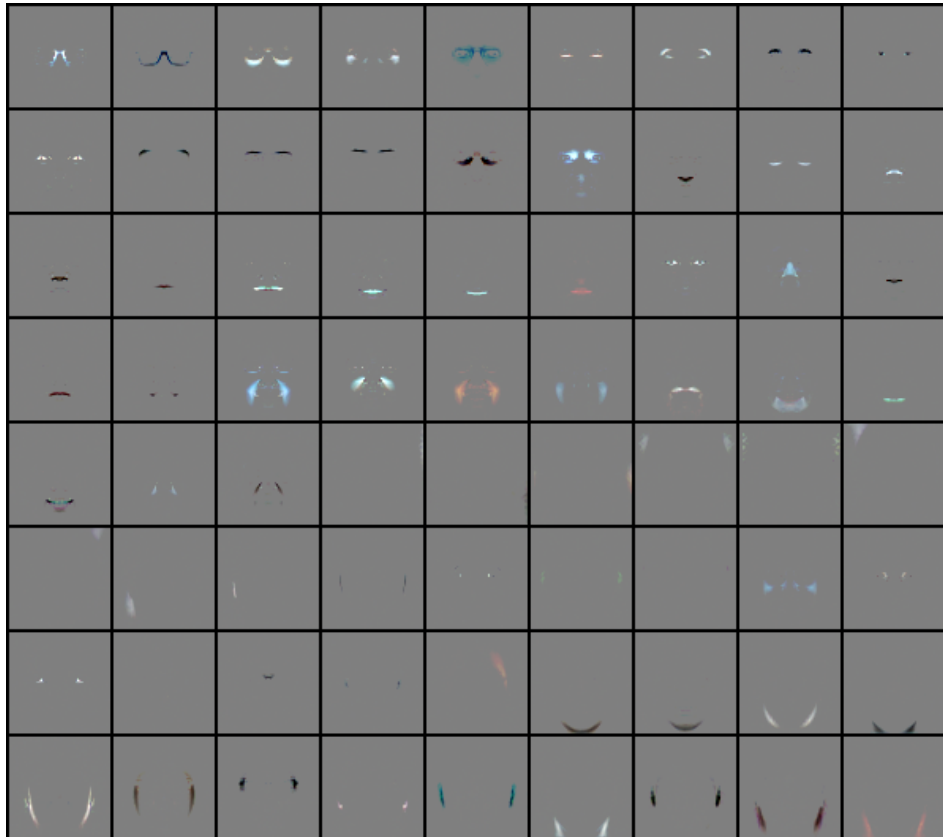
(b) **Green**

(c) **Red**

Figure 18: Albedo components of FFHQ StyleGAN with $\alpha = 2, \beta = 1$.

(b) Green

(c) Red

(d) Cyan

Figure 19: Albedo components of FFHQ StyleGAN with $\alpha = 0.3$, $\beta = 1$.

2.2 Changing β value

By increasing β, we see the components distributed more independently and tend to control more pixels in the image domain.
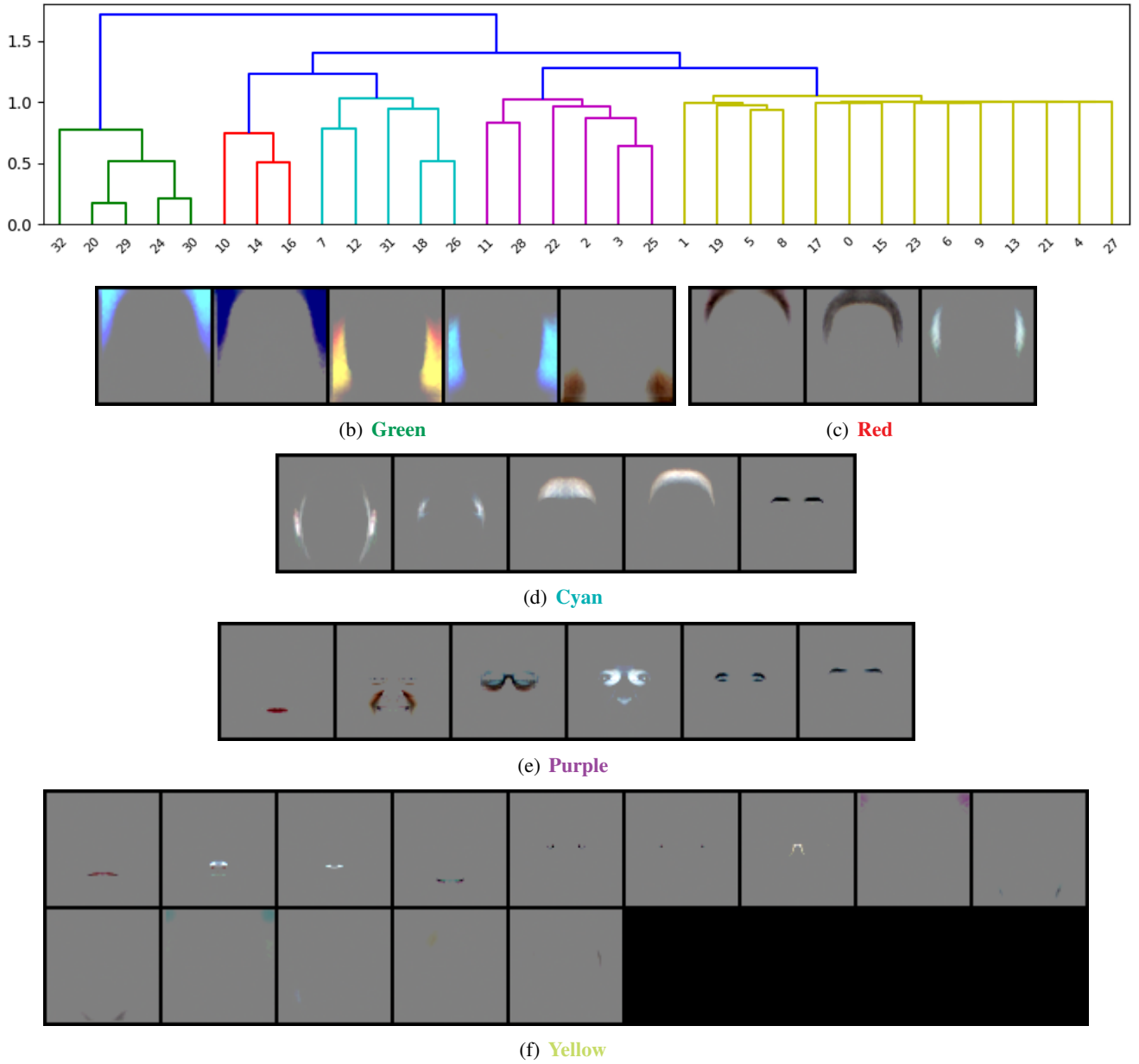

(b) **Green** (c) **Red**
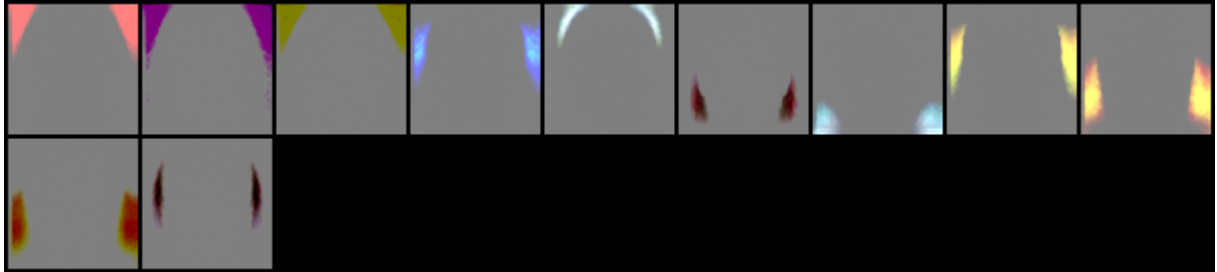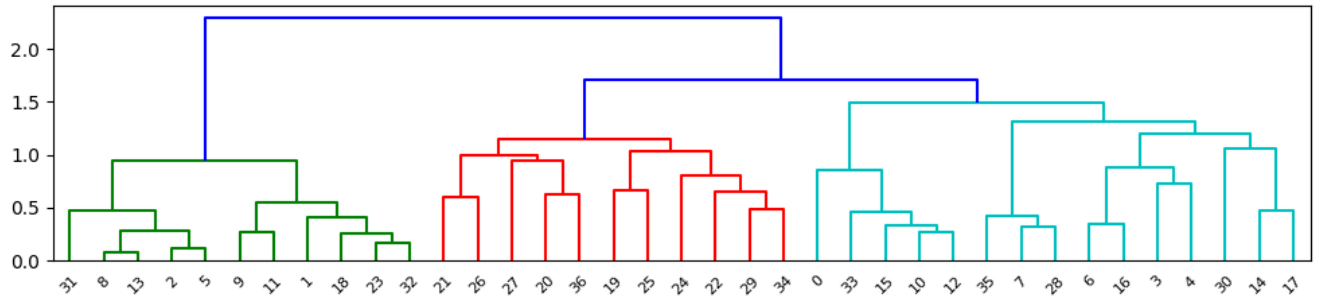

(d) **Cyan**
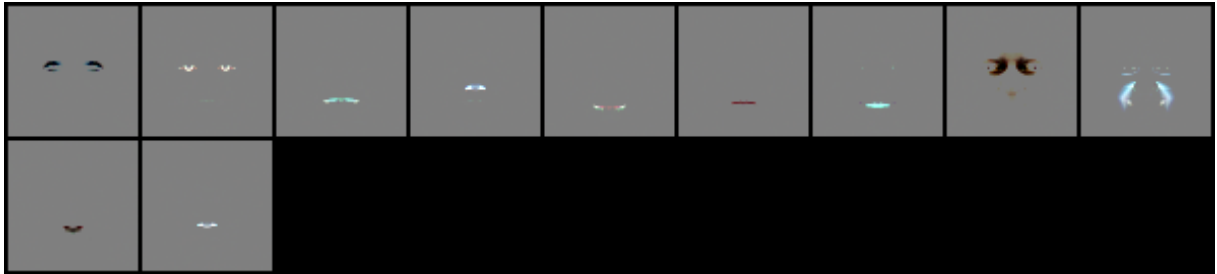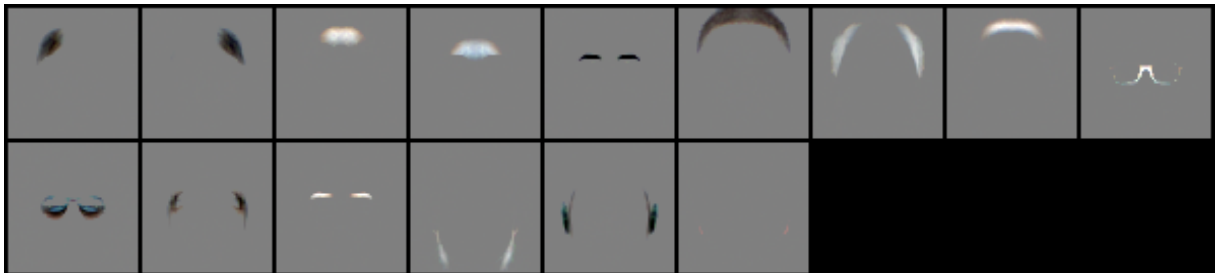

(e) **Purple**

(f) **Yellow**

Figure 20: Albedo components of FFHQ StyleGAN with $\alpha = 1$, $\beta = 100$.
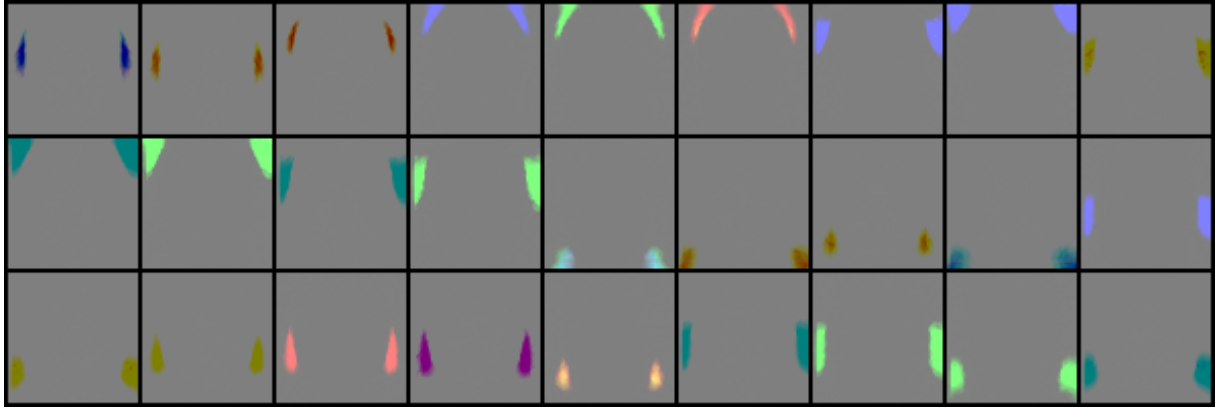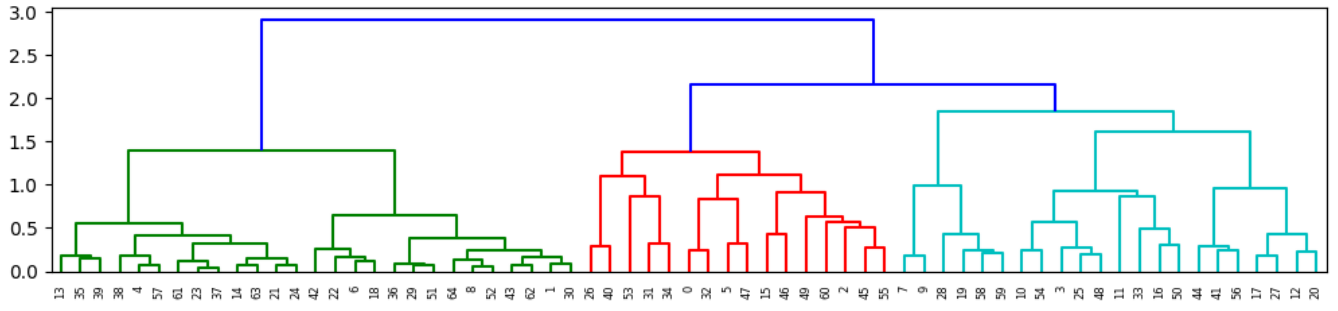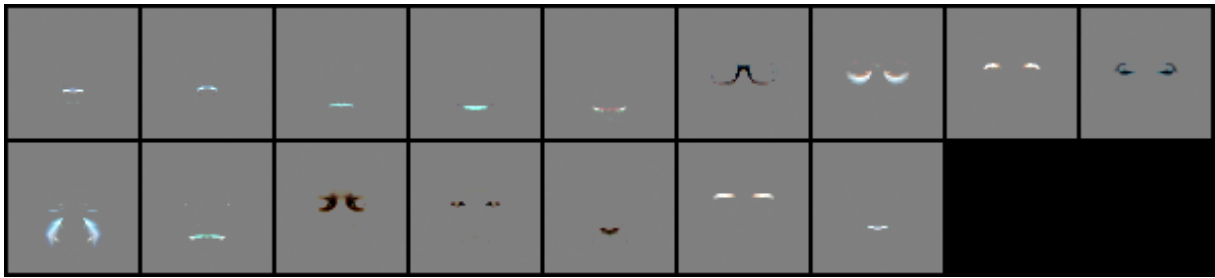
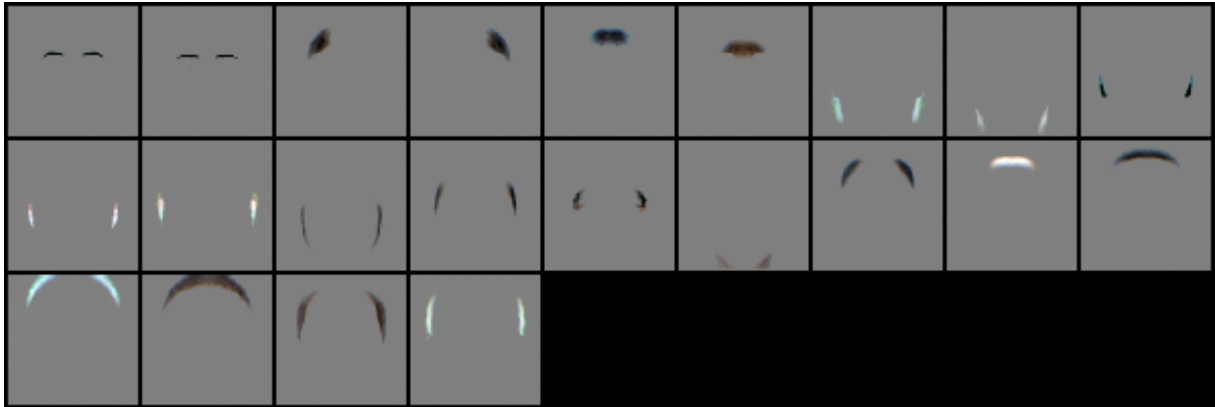(b) **Green**

(c) **Red**

(d) **Cyan**

Figure 21: Albedo components of FFHQ StyleGAN with $\alpha = 1$, $\beta = 10$.
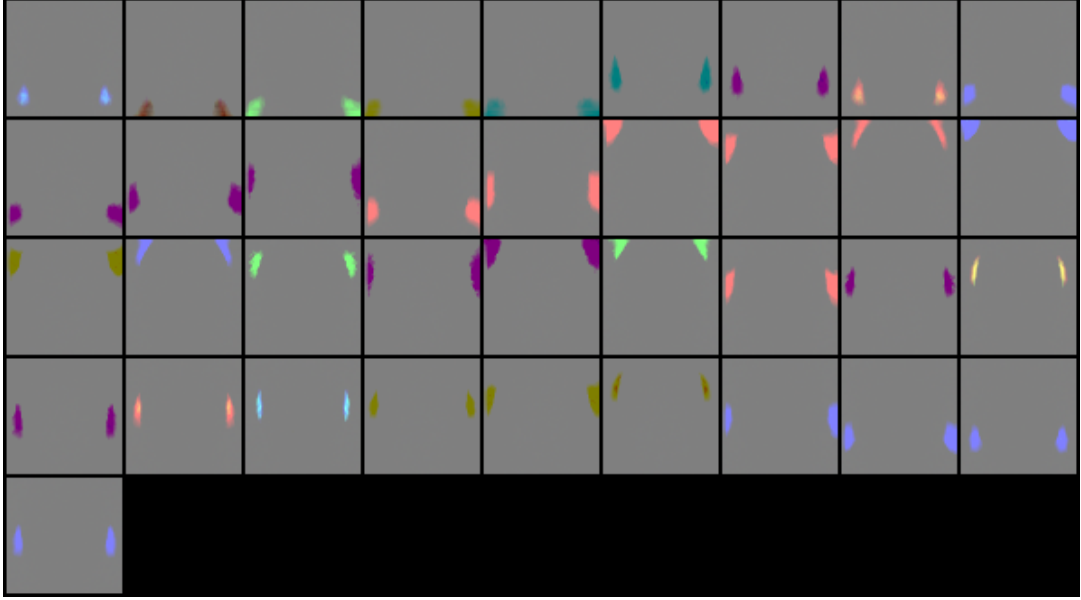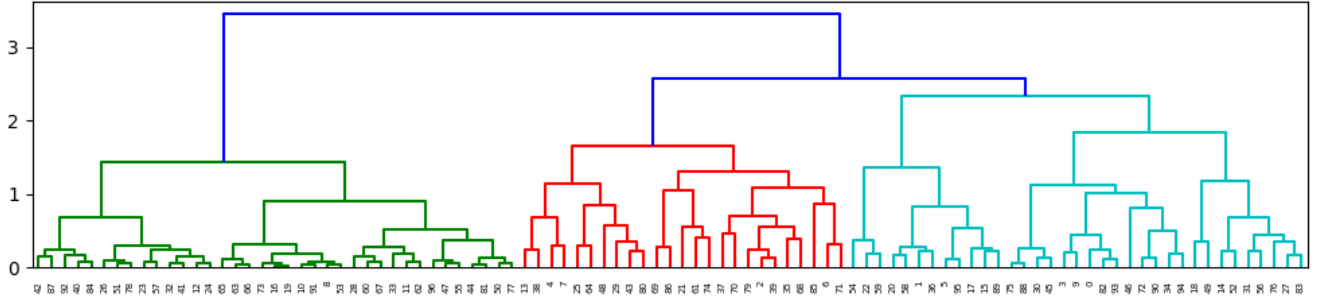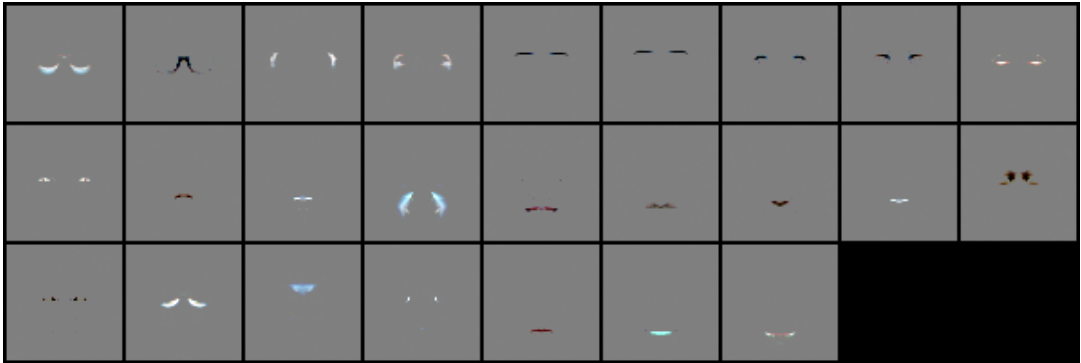
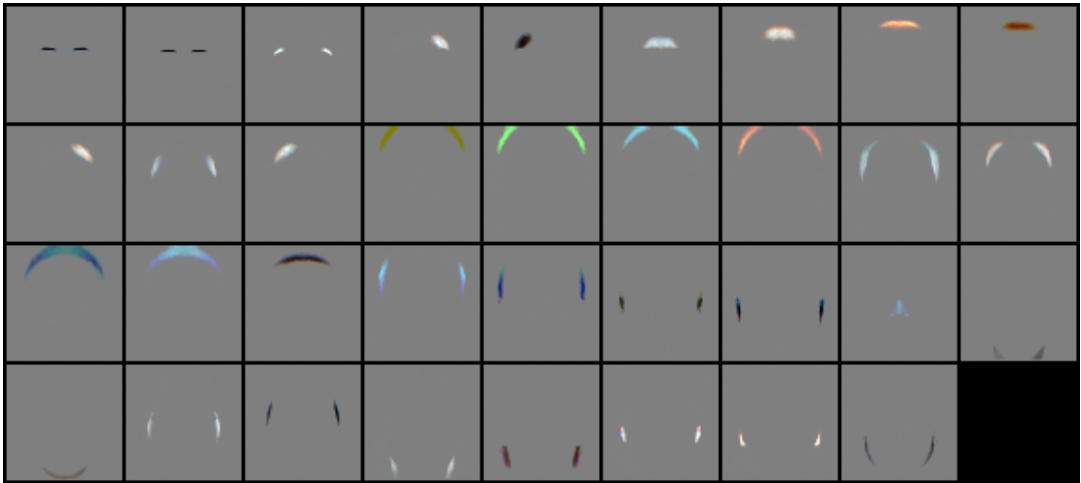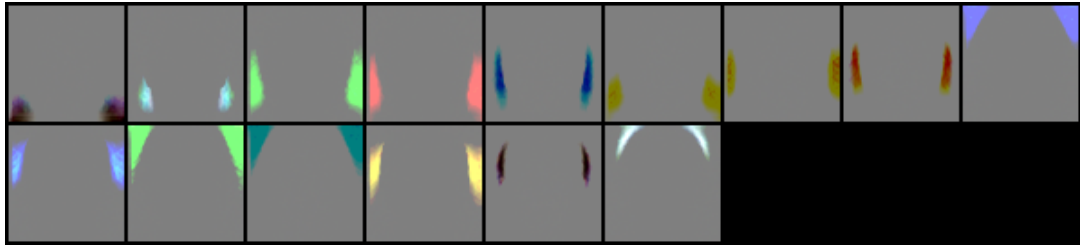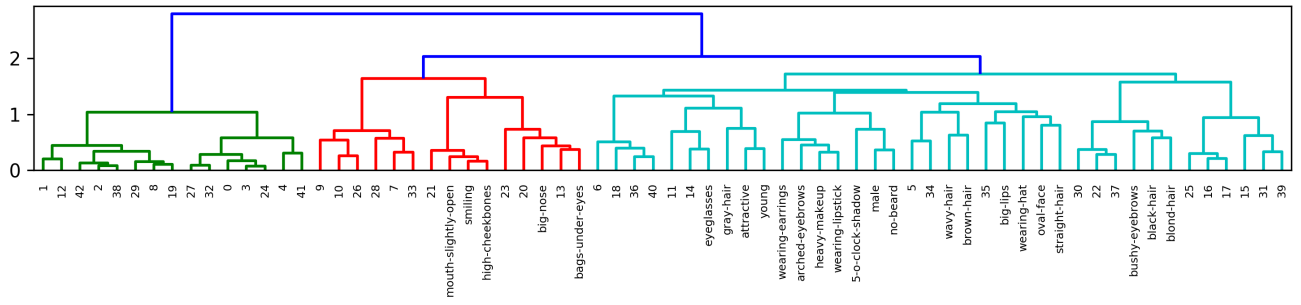(b) **Green**

(c) **Red**

(d) **Cyan**

Figure 22: Albedo components of FFHQ StyleGAN with $\alpha = 1$, $\beta = 0.1$.
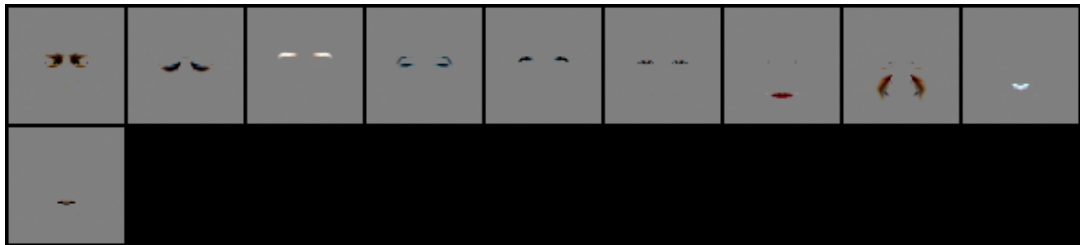
(b) Green

(c) Red

(d) Cyan

Figure 23: Albedo components of FFHQ StyleGAN with $\alpha = 1$, $\beta = 0.01$.
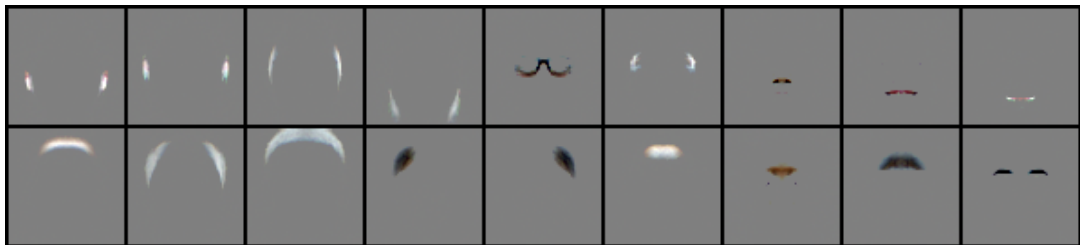
2.3 Similarity with CelebA facial attributes

(b) **Green**: 1, 12, 2, 38, 42, 8, 19, 29, 27, 32, 3, 24, 0, 4, 41

(c) **Red**: 10, 26, 9, 7, 33, 28, 21, 13, 20, 23

(d) **Cyan**: 36, 40, 18, 6, 14, 11, 5, 34, 35, 22, 37, 30, 16, 17, 25, 31, 39, 15

Figure 24: Cosine similarity between localized facial semantics and CelebA facial attributes.