

The Magic Lens: Refractive Steganography

Supplemental Material

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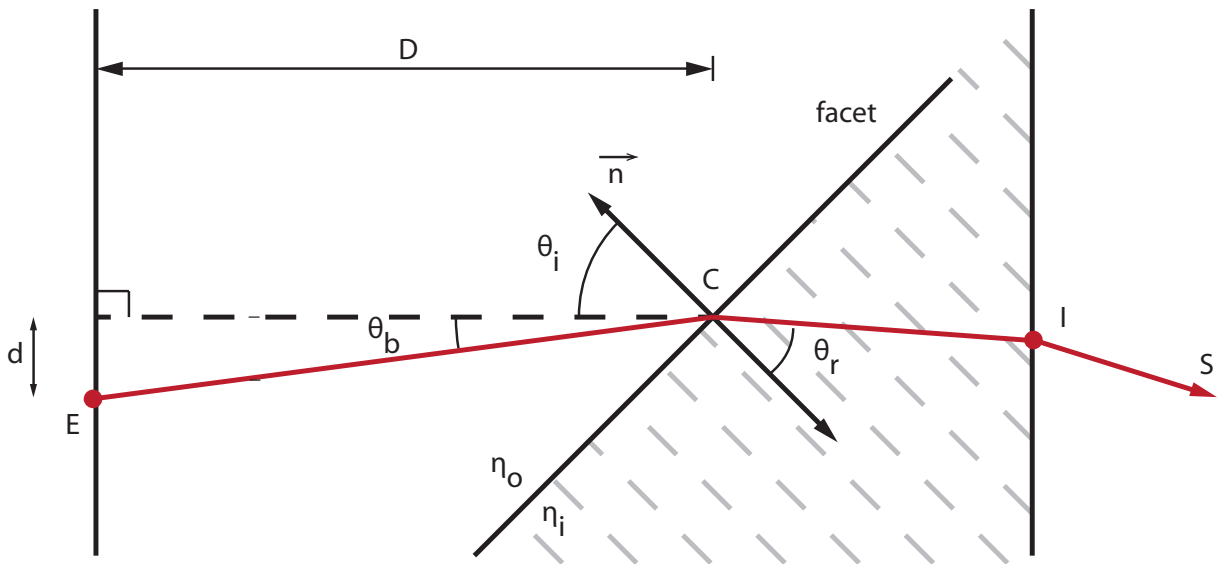


Figure 1: Facet orientation geometry.

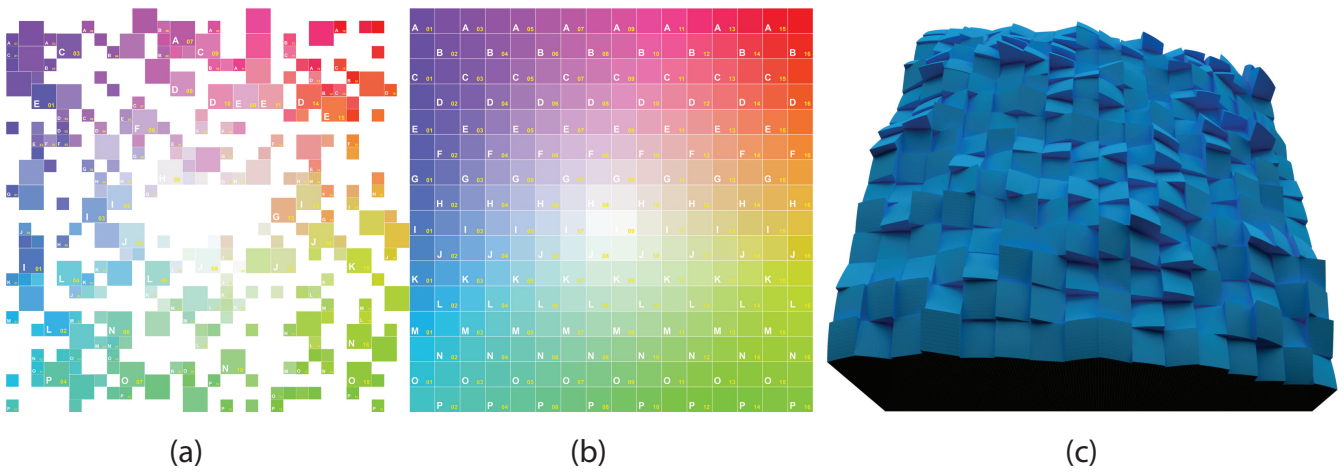


Figure 2: Bijection lens and targeted regions on the source image represented on the target image with a colored grid.
 (a) Source image.
 (b) Target image.
 (c) Lens (Bijection approach – 16×16 micro-facets – 11×11 nano-facets – with HO – 1 centimeters from source image – 49 centimeters from lens).

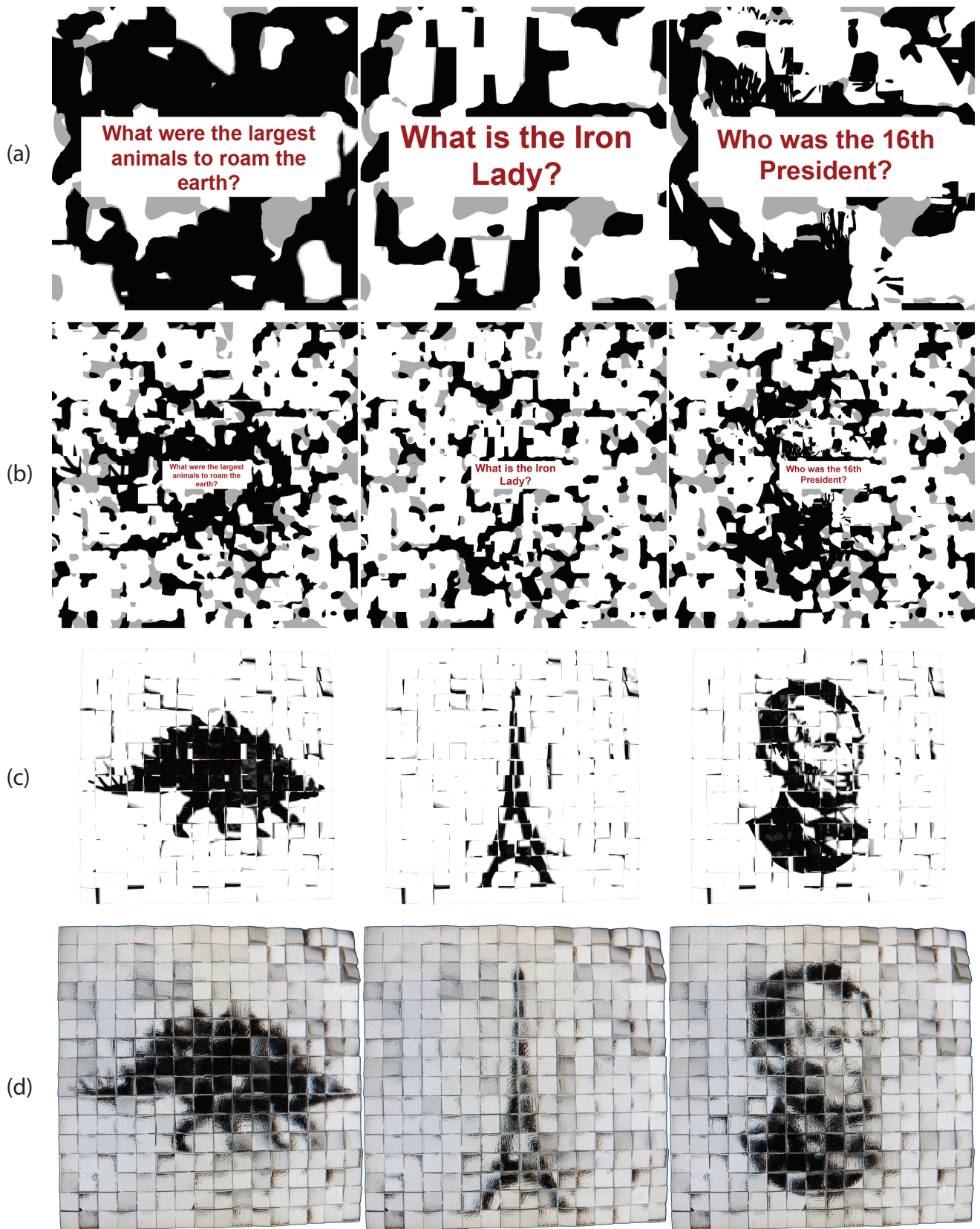


Figure 3: Questions and answers (part 1)

(a) Zoom on the source images question.

(b) Source images (Dino image (c) Rendering simulations.

(d) Photographs of a manufactured lens when placing it over the corresponding source images.

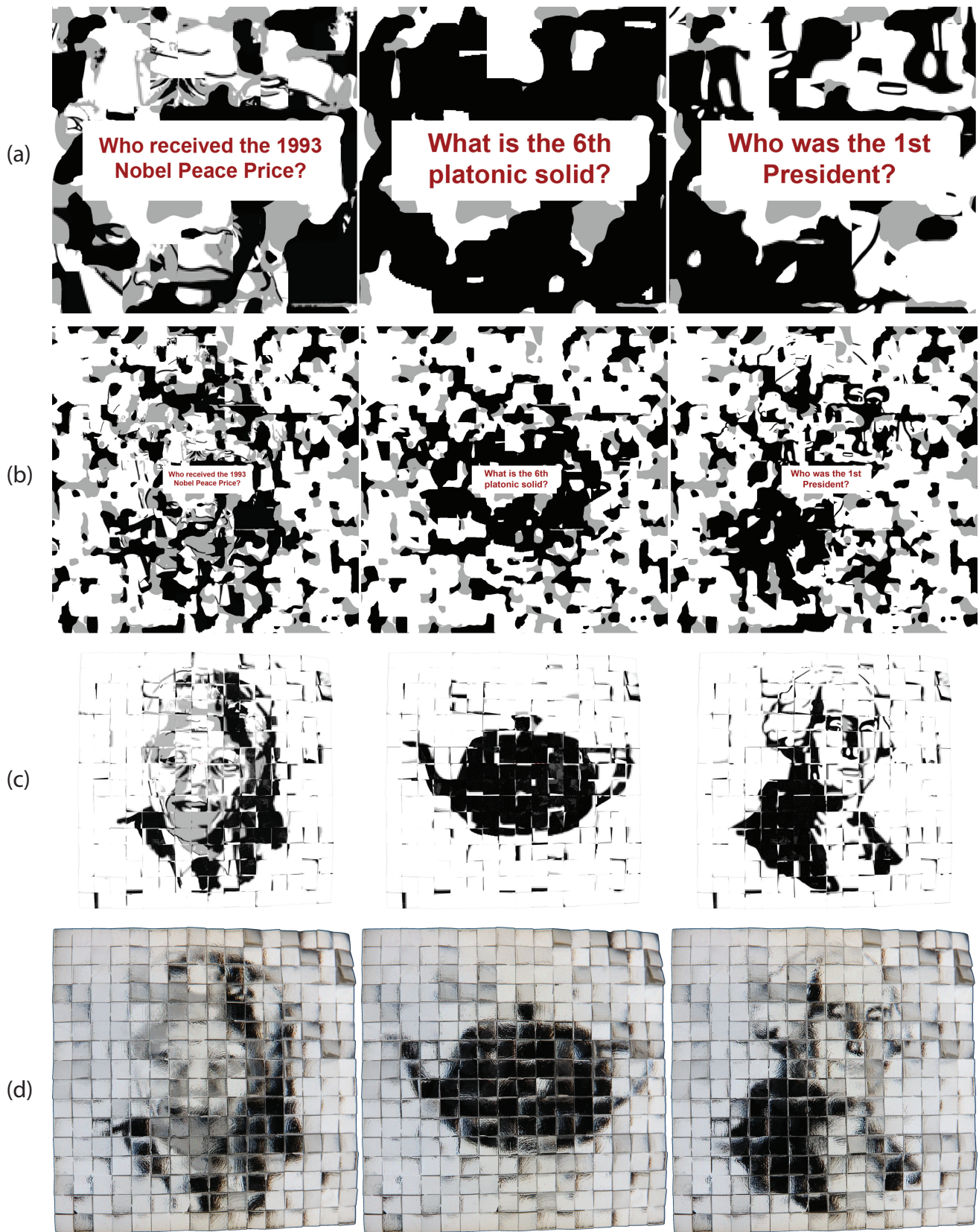


Figure 4: Questions and answers (part 2)

(a) Zoom on the source images question

(b) Source images.

(c) Rendering simulations.

(d) Photographs of a manufactured lens when placing it over the corresponding source images.

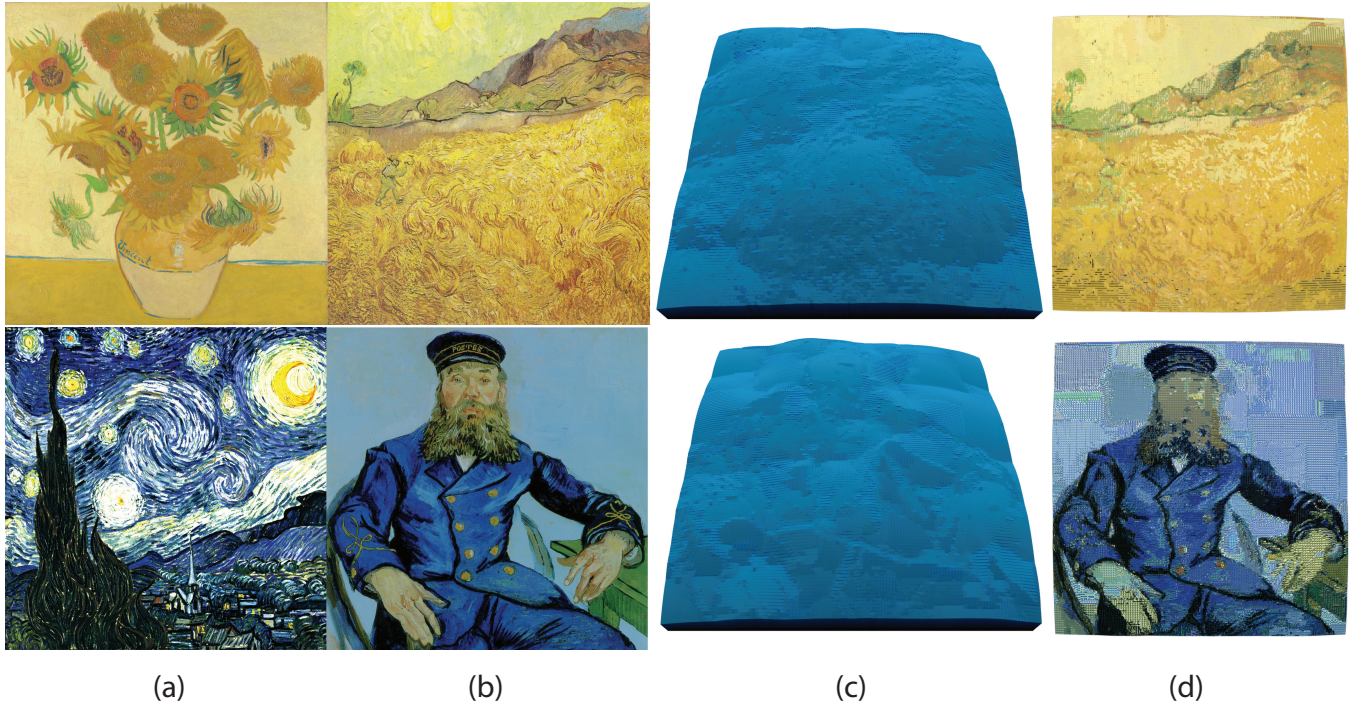


Figure 5: High resolution morphing of two pairs of paintings.
 (a) Source images (Sunflowers ©Wikimedia Commons, Starry night ©Wikimedia Commons).
 (b) Target images (Reaper ©Wikimedia Commons, Postman ©Wikimedia Commons).
 (c) Lens (Patch-Matching approach – 128×128 micro-facets – 11×11 nano-facets – with HO – with SA – 10 centimeters from source image – 40 centimeters from lens).
 (d) Rendering seen through the lens when placing it over the source image.

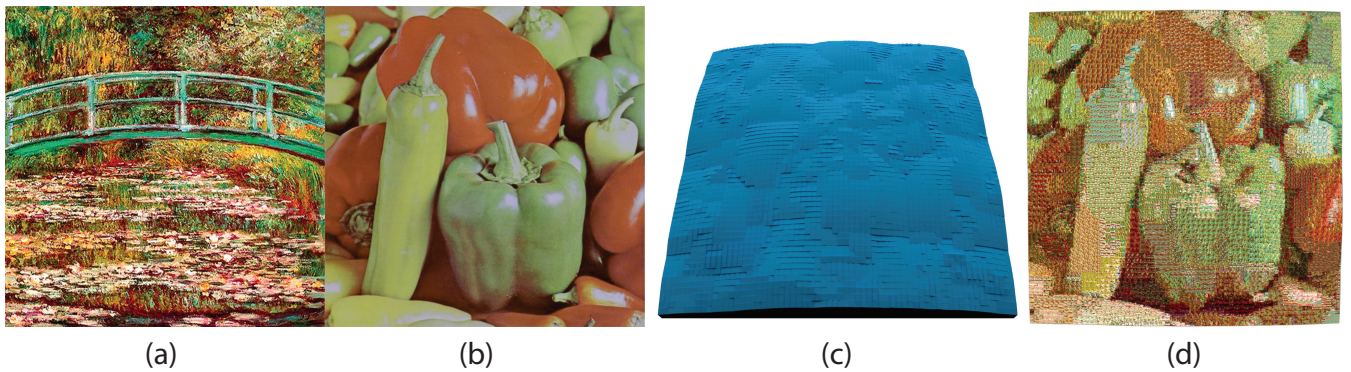


Figure 6: Low resolution morphing of a painting to a real world image.
 (a) Source image (Water-Lily Pond ©Wikimedia Commons).
 (b) Target image.
 (c) Lens (Patch-Matching approach – 64×64 micro-facets – 11×11 nano-facets – with HO – with SA – 10 centimeters from source image – 40 centimeters from lens).
 (d) Rendering seen through the lens when placing it over the source image.

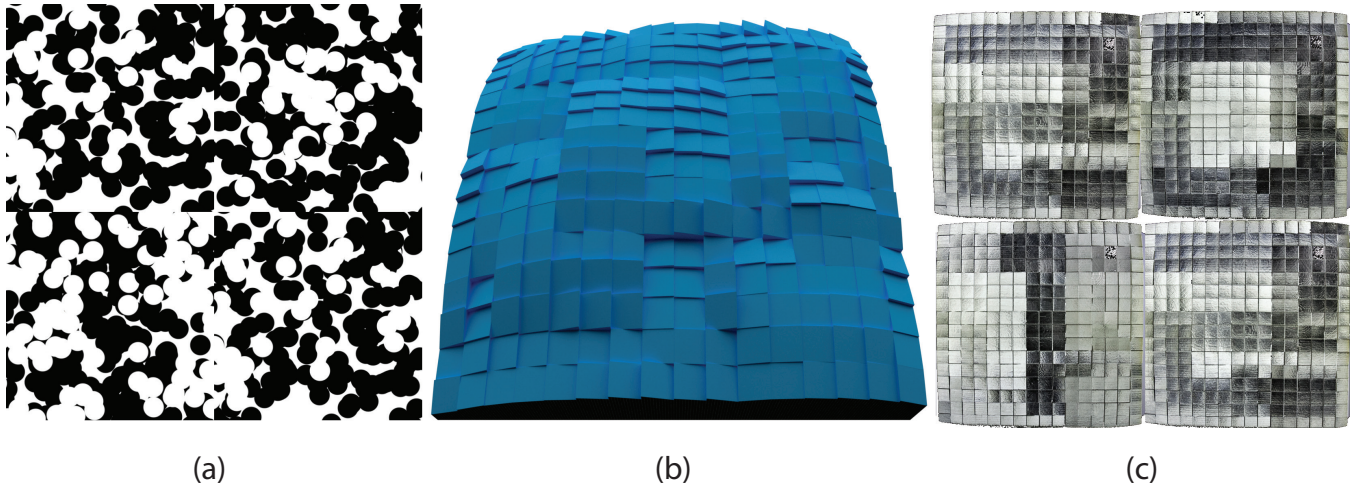


Figure 7: Low resolution morphing printed lens.

(a) Four different source images.

(b) Lens (Patch-Matching approach – 16×16 micro-facets – 11×11 nano-facets – with HO – with SA – 10 centimeters from source image – 40 centimeters from lens).

(c) Four photographs of a manufactured lens when placing it over the corresponding source images.

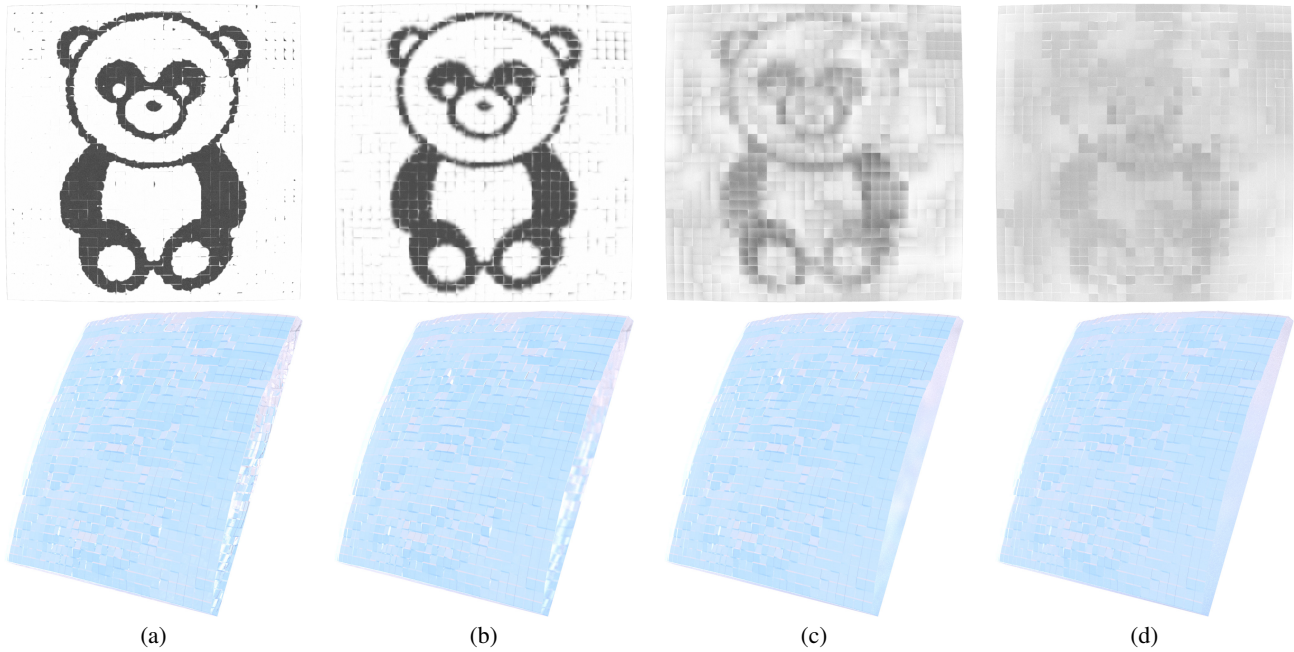


Figure 8: Evolution of the render quality (top) and the lens aspect (bottom) in function of the material roughness.

(a) No roughness.

(b) 0.01 roughness.

(c) 0.05 roughness.

(d) 0.10 roughness.

We used the model by Walter et al. [?] with the GGX Probability Distribution Function (PDF) for the micro-facets. The roughness values reported are the actual α_g used for the renderings. (Panda image ©Web Design Hot)