

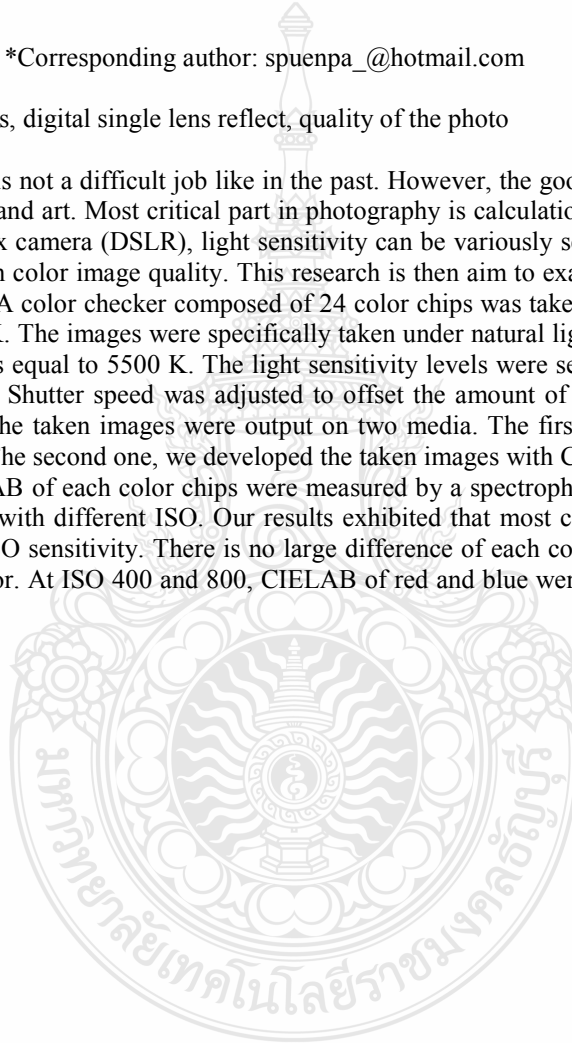
EFFECT OF SENSITIVITY LEVELS OF DIGITAL SINGLE-LENS REFLEX CAMERA ON COLOR IMAGE

Suwat PUENPA and Onsucha UPAKIT
*Color Research Center, Faculty of Mass communication Technology,
Rajamangala University of Technology Thanyaburi, Thailand.*

*Corresponding author: spuenpa_@hotmail.com

Keywords: sensitivity levels, digital single lens reflect, quality of the photo

Photography now is not a difficult job like in the past. However, the good photography requires both knowledge in science and art. Most critical part in photography is calculation of the exposure light. For digital single-lens reflex camera (DSLR), light sensitivity can be variously set. That light sensitivity strongly has an influence on color image quality. This research is then aim to examine the effect of light sensitivity on color image. A color checker composed of 24 color chips was taken by a DSLR setting its color temperature at 5500 K. The images were specifically taken under natural light or sunlight when the color temperature of light is equal to 5500 K. The light sensitivity levels were set at ISO 100, 200, 400, 800, 1600, 3200 and 6400. Shutter speed was adjusted to offset the amount of light in order to obtain normal exposure images. The taken images were output on two media. The first one, the taken images were output on a monitor. The second one, we developed the taken images with C-41 process and printed out on glossy paper. CIELAB of each color chips were measured by a spectrophotometer and compared between each image taken with different ISO. Our results exhibited that most color in the taken image were slightly affected by ISO sensitivity. There is no large difference of each color in each taken image except for red and blue color. At ISO 400 and 800, CIELAB of red and blue were significantly different from reference values.



ASSESSMENT OF LENS SHARPNESS AND DEPTH OF FIELD BASED ON PSYCHOPHYSICAL METHOD

C. Saksirikosol^{1*}, K. Rattanakasamsuk² and P. Dolkit¹

¹*Department of Photography and Cinematography Technology, Faculty of Mass Communication Technology,
Rajamangala University of Technology Thunyaburi, Thailand.*

²*Department of Printing Technology, Faculty of Mass Communication Technology,
Rajamangala University of Technology Thunyaburi, Thailand.*

*Corresponding author: Chanida Saksirikosol, (+66)824602112, e-mail:dadahz69@gmail.com

Keywords: Lens, Sharpness, Resolution

ABSTRACT

This research aims to assess the performance of the lens in terms of image sharpness and acceptable level of Depth of Field of three types of lens which are 18-105 mm f/3.5-5.6G, 50 mm f/1.8D, and 50 mm f/1.4G. The sharpness performance was measured by comparing the photo details in the resolution test chart. The image sharpness level was examined by taking photos in five different focal distances which were focal length, +/- 10 cm focal length and +/-20 cm focal length. Also, the aperture of photo taking was specified at 8. To evaluate the result, the pairwise comparison method was used to collect the data from ten subjects who were had normal vision or to normal corrected. The performance result of sharpness expression of lens orderly were 50 mm f/1.4G, 50 mm f/1.8D and 18-105 mm f/3.5-5.6G in terms of acceptable sharpness of human eyesight which each lens had different depth of field

INTRODUCTION

The photos were used since the ancient time. There have been a lot of reasons that people would take a photo to follow their individual objectives including for recording the situations, for beauty, for being the teaching media, for evidences, for research benefits, etc. However, the most important point of photo taking is to be a medium functioning of narrating for the photographer's purposes in order to fluently tell the story to the photo audiences as the Chinese idiom saying that "A picture is worth a thousand words." In the present, people accept that images can be communicated better than other auditory nerves according to the psychologist's research reporting that humans can perceive things by five auditory nerves (eyes, ears, nose, tongue, and body touch). On the other hand, the best perceptive auditory nerve is eyes which are 80 percent perceptible compared to other auditory nerves. So, photos are media which help humans to correctly and quickly distinguish. [1]

Currently, the quantity of using 35 mm single lens DSLR camera is relatively high which can be seen from the growth of Nikon circulation in Thailand of 135,000 or 6,000 million Thai baht. Besides, lenses, another additional device that people usually buy, have different prices. Different lens prices affect an image quality which lenses contrarily express. For the quality or sharpness, the photographers have to wisely choose the appropriate lenses for their works. [2]

A factor resulting in the image sharpness is lens quality which is the most vital for the camera. Whether a photo will have a great quality depends on the lens quality. Lens is a transparent material made of glass or plastic in the circle shape with smooth surface and is usually glazed by the blue or brown solution in order to protect the reflecting or refracting light. Cheap cameras frequently have low quality lens. On the contrary, expensive cameras would use high quality lens and are able to highly transmit the light. How much lens quality will produce crystal-clear image relies on lens material quality, composed techniques, and lens arrangement. [3]

As stated, there are a lot of 35 mm single lens DSLR camera users with various sorts. Cameras and lenses, therefore, have diverse prices and qualities. Usage is depended on the photo taking purposes and applications since each photo type needs different sharpness. The researcher, consequently, would like to study the sharpness expression performance and depth of field which are acceptable for the 35 mm single lens DSLR camera.

METHODOLOGY

Table 1. Specifications of lens

Specifications Lens	Lens Elements	Maximum Aperture	Minimum Aperture	Vibration Reduction System
Nikon AF-S DX NIKKOR 18-105 mm f/3.5-5.6G ED VR	15	3.5-5.6	22-38	Available
Nikon AF 50 mm f/1.8D	6	1.8	22	-
Nikon AF-S NIKKOR 50 mm f/1.4G	8	1.4	16	-

The researchers determined the methodology as follow

1. Study the lens sharpness expression performance by taking photos standard chart of resolution test chart [4] with three types of lenses. The specifications of 3 lenses are shown in Table 1.
2. Study the depth of field of acceptable human vision by taking photos in various focal distances, focal length, +/- 10 cm focal length and +/-20 cm focal length, and equally specifying the used aperture of eight. The in five different focal distances are shown in Figure 1.

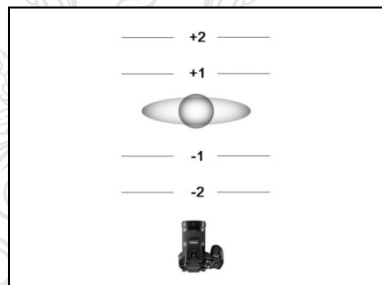


Figure 1. Example of focal length

3. Collect the data by presenting photos to ten samples to evaluate the lens sharpness performance and find the depth of field of acceptable human vision in the pairwise comparison method. Photos were seen to evaluate the sharpness in a room without other materials and the room was controlled the brightness equally every time.

RESULT

The results of the lens sharpness performance of all three studied lens types carry various sharpness expressions. That is, the lenses which have performance of the highest sharpness performance are AF-S NIKKOR 50 mm f/1.4G lens, the Nikon AF 50 mm f/1.8D lens, and Nikon AF-S DX NIKKOR 18-105 mm f/3.5-5.6G ED VR respectively. The Performance of lens are shown in Table 2.

Table 2. Performance of lens in terms of the image sharpness

Lens \ Resolutions (Line)	Nikon AF-S DX NIKKOR 18-105 mm f/3.5-5.6G ED VR	Nikon AF 50 mm f/1.8D	Nikon AF-S NIKKOR 50 mm f/1.4G
Center	1200	1400	1400
Corner	1200	1300	1400
Border	1100	1200	1400

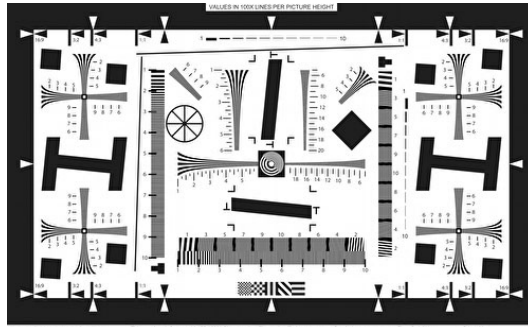


Figure 2. Example of Resolution Test Chart

In the acceptable sharpness length, according to the study, all three types of lens have the sharpness depth of field that is acceptable for human eyesight differently. That is, AF-S NIKKOR 50mm f/1.4G has sharpness length that is acceptable for the human eyesight from -20 cm focal length to +20 cm focal length. Next, Nikon AF 50 mm f/1.8D lens has the acceptable human eyesight sharpness length from -10 cm focal length to +20 cm focal length. The Nikon AF-S DX NIKKOR 18-105 mm f/3.5-5.6G ED VR lens has the acceptable human eyesight from -10 cm focal length +20 cm to focal length.

Table 3. Performance of lens in terms of acceptable level of Depth of Field.

Lens \ Focal Length	Nikon AF-S DX NIKKOR 18-105 mm f/3.5-5.6G ED VR	Nikon AF 50 mm f/1.8D	Nikon AF-S NIKKOR 50 mm f/1.4G
Focal Length -20 cm	×	×	○
Focal Length -10 cm	○	△	◎
Focal Length	◎	○	◎
Focal Length -10 cm	◎	○	◎
Focal Length -20 cm	○	△	◎

Remark ◎ = "Very good" ○ = "Good" △ = "Acceptable" × = "Poor"



Figure 3. Example of Acceptable level of Depth of Field images from Nikon AF-S DX NIKKOR 18-105 mm f/3.5-5.6G ED VR (Focal Length -20 cm (-2), Focal Length -10 cm (-1), Focal Length (0), Focal Length -10 cm (+1), Focal Length -20 cm (+2))

CONCLUSION

We found that the lenses with the performance of sharpness expression and highest is Nikon AF-S NIKKOR 50 mm f/1.4G, Nikon AF 50 mm f/1.8D and Nikon AF-S DX NIKKOR 18-105 mm f/3.5-5.6G ED VR respectively.

REFERENCES

- [1] Pakpimol Senee. **Photography for communication**. Printing Operating Center. Patumthani. 2006.
- [2] AMB Magazine. **Success Lesson of Nikon Sales (Thailand)**. Retrieved on 25th April 2012 <http://www.mbamagazine.net/index.php/marketing-menu/868-nikon-sales-thailand>
- [3] Suradech Wongsinlung. **All About Lens**. Amarin Printing and Publishing Public Company. Bangkok. 2012.
- [4] Stephen H. Westin. **2010. ISO 12233 Test Chart**. Retrieved on 20th December 2012 <http://www.graphics.cornell.edu/~westin/misc/res-chart.html>