NOTE ON STEREOSCOPY

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ALTHOUGH the subject matter of this note is not in any way new, it is felt that the note is timely inasmuch as several contributors[1] to PHOTOGRAMMETRIC ENGINEERING have maintained that by increasing the stereoscopic viewing distance, when viewing a pair of overlapping aerial photographs, the apparent relief will be exaggerated.

This fallacious reasoning results from reliance upon the geometric projection of rays without reference to the reason that we see stereoscopically. Figure 1 shows the basis for this incorrect solution. This diagram suggests that when the

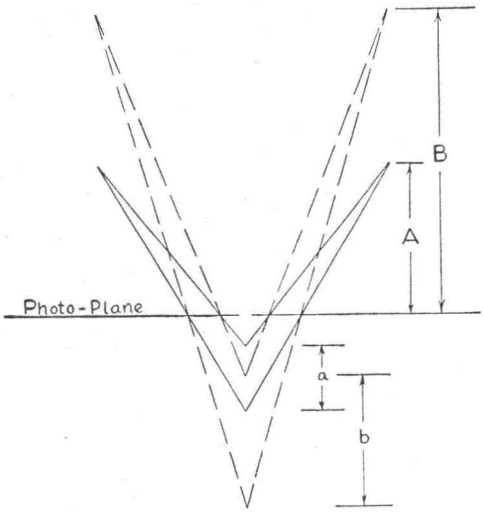

FIG. 1. The geometric projection of rays without reference as to why we see stereoscopically.

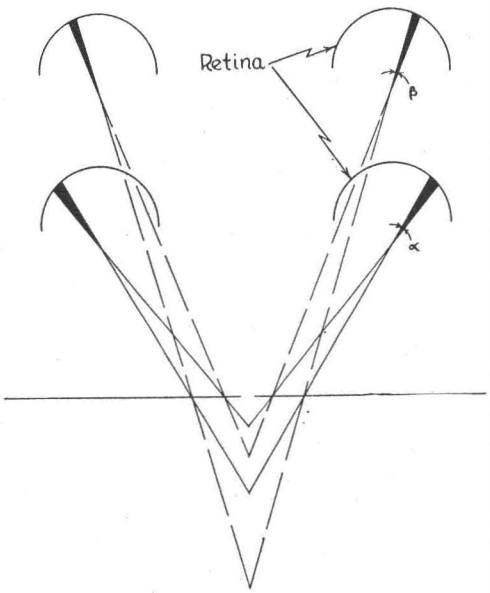

FIG. 2. The same projection of rays as in Figure 1 projected back upon the retina of the human eye.

viewing distance A is increased to B, the apparent relief a is exaggerated to equal b.

In 1844, Sir Charles Wheatstone evolved his own theory, that the difference between the two retinal images is essential to the perception of depth. Modern theory follows the Wheatstone concept, and in today's language, depth perception is considered to be a function of retinal disparity. Figure 2 clearly shows that the retinal disparity diminishes when the viewing distance is increased; angle α diminishes to angle β. This is just another way of saying that the differential parallactic angle has diminished. In Figure 3, angle β_1 is the parallactic angle to point A and angle β_2 is the parallactic angle to point B. The distance AB is

[1] Kistler, Phillip S., "Viewing Photographs in Three Dimensions," PHOTOGRAMMETRIC ENGINEERING, Vol. XIII, No. 1, March 1947, p. 127.

Wood, Jr., Edward S., "Photogrammetry for the Non-Photogrammetrist," PHOTOGRAMMETRIC ENGINEERING, Vol. XV, No. 2, June 1949, p. 249.

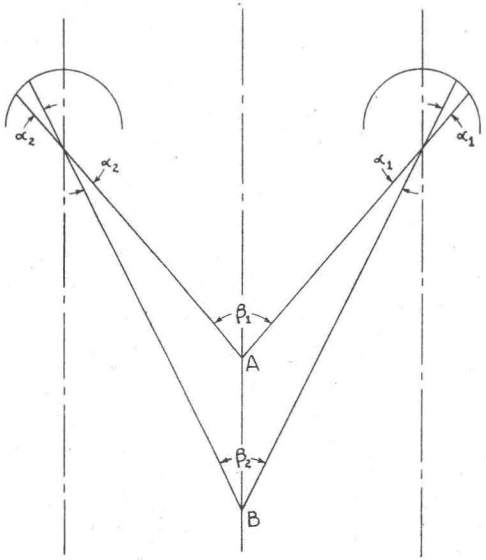

FIG. 3. Retinal disparity a function of the differential parallactic angle.

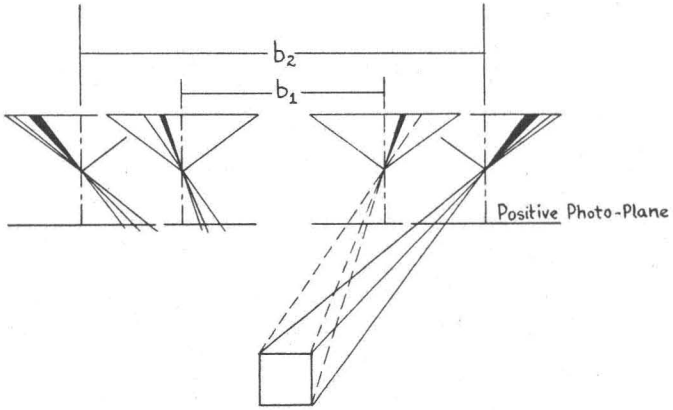

FIG. 4. (a) Exaggeration of apparent relief by an increase of the air-base distance.

(b) Exaggeration of apparent relief by enlarging the photographic images.

therefore equal to the difference of the parallactic angles, $\beta_1-\beta_2$. It is obvious that $\alpha_1+\alpha_2=\beta_1-\beta_2$, and therefore that depth perception is a function of retinal disparity. The greater the depth (AB), the larger the angle α, and hence the greater the retinal disparity.

There are only two basic ways of exaggerating apparent relief. One is by increasing the air base distance when accomplishing photography, and the other is by the enlargement of the photographic images. From Figure 4 (a) it is apparent that by increasing the air base distance from b_1 to b_2 the differential parallactic angle is increased and therefore the apparent relief will be exaggerated when the photographs are viewed through a stereoscope. Figure 4 (b) illustrates that by enlarging the photographic images, on the photography accomplished from the air base distance b_1, the differential parallactic angle is also increased. The dashed lines represent the rays from the photographic images of the original scale, and the solid lines represent the rays from the enlarged scale.

NEWS NOTES

RELIEF MODEL IN LIGHT WEIGHT PLASTIC

The following is a part of a news release by Aero Service Corporation.

A striking, three dimensional perspective of the United States is provided by the first relief model ever made of this country in lightweight plastic. Formed in durable Vinylite, this big, colorful map weighs only 2¼ pounds. It is 64 inches wide by 40 inches deep. One inch on the map equals 50 miles, and its vertical exaggeration is 20 to 1.

The new map is preprinted in 11 colors. The flat Vinylite sheets are lithographed, then placed over the mold and formed under heat and pressure. In a few seconds, the flat plastic becomes a detailed relief map. These new maps cost less than old-fashioned, fragile plaster maps which often weigh 50 times as much.

A frame of the same durable plastic as the U. S. map itself contains grommets so the map can be hung from four small nails in the classroom, reception room or business office. Dust and fingermarks can be wiped off easily with a damp cloth.

The price of this new three dimensional map of the United States is $37.50, including delivery.

NEW DEVICE FOR TRAINING AERIAL-PHOTO INTERPRETERS

The parallax wedge is becoming increasingly important as a rapid and relatively accurate method of measuring tree heights and other elevation differences on vertical air photos. A stereogram developed to speed the training of students in the use of the wedge is reported in Station Note No. 60 of the Central States Forest Experiment Station, U. S. Forest Service, Columbus, Ohio.

A period of hours is often consumed in demonstrating to students the correct appearance of a parallax wedge under stereoscope. The stereogram is a simple training aid illustrating this stereo-illusion of the wedge on a photo image of a group of trees. Tests show that the stereogram greatly reduces the time necessary to train students.

Copies of Station Note No. 60 demonstrating the use of this training aid are available upon application to the Central States Forest Experiment Station.

PHOTOGRAPHIC PROCESSES FOR BUSINESS AND INDUSTRY

Applications of photography in business and industry are summarized in a new, 16-page booklet published by the Eastman Kodak Company, and entitled "Functional Photography in Industry." The text, prepared in non-technical language, sums up these methods and the results. Numerous illustrations depict their use for research, production, quality control, training, advertising, and sales. The booklet is available without charge from the Industrial Photographic Division, Eastman Kodak Company, 343 State Street, Rochester 4, New York.