

PERCEPTUAL CORRELATES OF PREJUDICE: A
STEREOSCOPIC-CONSTANCY EXPERIMENT*¹

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A. INTRODUCTION

Recent mention has been made of a stereoscopic-constancy phenomenon that has been designated "The Engel Effect" (3, 4, 5). To produce this phenomenon, two different portraits are presented by means of a stereoscope to the left eye and the right eye. At first, one portrait is brightly illuminated; the other remains in the dark.

Gradually, the dark portrait is brightened, and *S* is asked (after each increment of brightness) whether or not he notes any change in his percept. When the illumination of the two visual fields is equivalent, the portrait that initially had been illuminated is gradually darkened, and inquiry is repeated at each step of lowered brightness. The Engel Effect consists of the fact that *no phenomenal change may be reported anywhere in this sequence despite the fact that the observer starts by being exposed to one face and ends by being confronted with a different one.*

Ittelson and Seidenberg (5) noted this effect in two-thirds of their *Ss*, when stimulus faces of the same sex and race were presented to the left eye and the right eye. Ittelson and Seidenberg found that a recognition of change occurred when more dissimilar stereograms (male-female and Negro-Caucasian) were used. The difference in reactions to the more similar stereograms and to the less similar stereograms ". . . supports the rather obvious notion that the Engel Effect breaks down as the stimulus-pairs become more disparate (5)."

Because the stereoscopic perception of relatively *dissimilar* portraits results in an awareness of change *at some point* in the psychophysical sequence, one can inquire whether or not individual differences in this threshold can be related to attitudes toward stimulus content. For instance, does the extent

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to which a person has adopted a masculine or a feminine role influence his perception of transition in the male-female stereogram? Is a high level of prejudice reflected in later or in earlier transmutation of the Caucasian-Negro stereogram? Ittelson and Seidenberg hypothesized the existence of threshold differences of the foregoing kind and indicated that the matter deserved further exploration (4).

Pettigrew, Allport, and Barnett (7) presented (in single exposures) bi-racial stereograms to prejudiced and nonprejudiced South Africans and reported as follows:

1. Afrikanders experience less binocular fusion and more binocular rivalry than do non-White South Africans.
2. Afrikanders tend to resolve Caucasian-Bantu slide pairs as either Caucasian or Bantu, rather than fusing them (into a "colored" or an "Indian" face).
3. When a stereogram is Colored-Indian, Afrikanders tend to see more "Bantu" or "Caucasian" faces than one expects by chance.

In the present study, we shall try to duplicate the foregoing findings in Ittelson and Seidenberg's "constancy" paradigm. We arranged to present Negro-Caucasian stereograms to prejudiced and nonprejudiced Ss and to raise and then lower the brightness of each face. We postulate threshold differences and we expect that prejudiced persons will have a relatively low tendency to "fuse" ethnically different faces in the transition from Face 1 to Face 2.

B. METHOD²

1. *Apparatus and Stimulus Material*

The apparatus used was an Engel stereoscope, which permits manipulation of the illumination levels independently for each eye. Portraits from student-identification cards were enlarged to provide the stereograms. To guard against recognition of the faces, cards five or more years old were used.³ All photographs were of males and were grouped in pairs, so that one photograph in each pair was of a Negro and the other was of a Caucasian. The major facial features of the two pictures stimulated roughly corresponding retinal points.

² The authors wish to thank Dr. S. Howard Bartley for providing Macbeth Illuminometer readings, and Dr. Irwin Kremen for helpful suggestions.

³ Engel (3) reports that in a few cases pictures that are recognized tend to dominate the visual field, and the characteristics of the so-called "binocular face" become mainly or wholly those of the person recognized.

2. Procedure

Students in introductory-psychology classes were given a Scale of Anti-Negro Prejudice. In our first (exploratory) experiments, a modified Adorno Ethnocentrism Scale, with subscales including the Anti-Negro Scale, was administered to 176 students (1). In a second experiment, a specially devised Anti-Negro Scale (in forced-choice format) was given to 232 students.⁴ In each case, the 25 students with the highest scores were assigned to the high-prejudice group; the 25 students with the lowest scores were assigned to the low-prejudice group. After a lapse of three to four weeks, Ss were individually contacted and asked to participate in an "experiment on vision." In the first study, 44 Ss were obtained (22 for each group). In the second study, 50 Ss were obtained (25 for each group).

In the experimental situation, each *S* was made familiar with the stereoscope. Then he was given the racially dissimilar stereograms, each one of which was carried through incremental changes in illumination. At the start of the series, the luminosity level was zero in the frame that was unilluminated and was 4.27 candles per square foot in the "fully illuminated" frame. In the first (exploratory) experiment, 10 steps brought the frame originally unilluminated to 4.27 candles per square foot, and another 10 steps brought the frame originally illuminated to zero illumination. In the second (main) experiment, six steps were used to bring the two frames to equal illumination (4.27 candles per square foot), and five more were used to bring the frame originally illuminated to zero illumination. In both studies, exposure time was held constant at two seconds.

To control for the effects of eye dominance, stereograms were randomized for each *S* with respect to each of the following features: stereogram presented first, order of stereograms thereafter, the eye that would receive illumination first, and whether the first portrait viewed would be that of a Caucasian or Negro (6).

Study No. 2 differed from Study No. 1 as follows:

1. In Study No. 2, two "fake" stereograms (featuring the same face to both eyes) were used to assess the effects of the *S*'s anticipatory set for perception of change.

2. In Study No. 2, randomization was restricted. At the start of each series, each *S* viewed four stereograms beginning with a Caucasian portrait and four beginning with a Negro portrait, and four beginning with the left eye and four beginning with the right eye. There were eight portraits in each series

⁴ Data on this scale will be presented in a subsequent paper.

and there were 10 series (counting the two "fake" slides). The random order for each *S* was determined independently of that for any other *S*. In Study No. 1, each *S* was presented with only five stereograms, alternated to control for eye dominance.

3. In Study No. 2, the scale used to separate *Ss* into the high-prejudice group and low-prejudice group was less subject to "faking good" than was that used in Study No. 1.

C. RESULTS

1. Study No. 1

We found no statistically significant perceptual differences between the high-prejudice group and the low-prejudice group. The number of *Ss* reporting fusion and the number of *Ss* reporting rivalry is identical in the two groups. There is a tendency for the high-prejudice group (as a group) to have more reports of rivalry than the low-prejudice group (52 *vs.* 37), but this difference cannot be tested statistically because many of the *Ss* did not report either fusion or rivalry.

All thresholds are lower for the low-prejudice group than for the high-prejudice group, but none of the differences is significant. Negro stereograms are found to be perceptually dominant. The Negro portrait is perceived earlier than the Caucasian portrait by both groups. For the low-prejudice group, $t = 1.963$ ($p < .05$ for a two-tailed test). For the high-prejudice group, $t = 2.674$ ($p < .01$ for a two-tailed test). There are no effects of order of presentation on point-of-threshold change; i.e., stereograms presented later in the series have neither elevated nor depressed thresholds, as compared with those presented earlier in the series. (Chi square for the contrast between Sets 1 and 2 *vs.* Sets 4 and 5 yields a $p > .20$.) Table 1 summarizes the findings.

TABLE 1
EARLIEST POINTS OF CHANGE REPORTED BY GROUPS

Change	Mean†		<i>p</i> *
	High-prejudice group	Low-prejudice group	
Rivalry-related	7.8	6.8	n.s.
Fusion-related	10.3	7.7	< .06
Complete dominance of the second target over the first	15.2	14.6	n.s.

* All tests are two-tailed, independent *t* tests.

† Means refer to step scale of illumination ranging from one to 20. One is the first presentation (second target unilluminated), 10.5 represents equal illumination of both targets, and 20 is the last presentation of the series (first target unilluminated).

2. Study No. 2

The results of Study No. 2 are substantially the same as those of Study No. 1. When a very liberal criterion of fusion-related change was used, it is found that the low-prejudice group gave more fusion reports than did the high-prejudice group ($t = 1.839$, $p < .05$ for a one-tailed test). Again, the Negro portraits are found to be perceptually dominant ($p < .01$ for a two-tailed test). There are no discernible effects attributable to the Ss' being set for perception of change. When the "fake" slides are viewed, the report typically is "No change," except for occasional, nonstimulus-related changes (e.g., "It looks closer now").

There is a slight (but nonsignificant) trend for the members of the high-prejudice group to have more reports of rivalry than is the case for members of the low-prejudice group and a (nonsignificant) tendency for the low-prejudice group to have more observations resulting in the complete Engel Effect (11 per cent of trials for the low-prejudice group and four per cent for the high-prejudice group).

In both studies, individual response styles are apparent, with some Ss tending to have consistently low or higher thresholds. Some Ss go through many intermediate changes prior to the dominance of the second stimulus field. Others do not.

D. DISCUSSION

Our most salient finding is the fact that results are less dramatic than those anticipated in the hypothesis. A general review of our data indicates that characteristics of the Engel Effect are at least partly responsible for this fact.

In the incomplete Engel Effect the typical sequence for most observers is as follows: First, the *S* tends to report "No change" until the level of illumination reaches a point at which minor intrusions of the second field are noted. At that point, the first field is at maximum brightness and the newly illuminated field is relatively dim.

The point at which the not-yet-perceived second object enters awareness (with elements of the old percept still present) usually occurs when the illumination of Field 2 considerably exceeds that of Field 1. In the case of our study, this result occurs with an average illumination of 2.46 candles per square foot for the old field and 4.27 candles per square foot for the new field. Prior to this point, the perceptual role of the incumbent field proves to be relatively small.

Complete dominance of the second field tends to occur almost at the very end of our series of exposures (with Field 1 illuminated by an average of only

0.34 candles per square foot). Up to that juncture, at least some elements of Field 1 tend to be represented in the percept.

At no point in the sequence do we find the usual result of stereoscopic observations with equivalent fields. There is relatively little routine rivalry or segregated superposition of objects or binocular fusion of the two images. If any of the three foregoing situations be labeled "AB," and if the situation in which the first target is exclusively or predominantly perceived be labeled "A" and that in which the second target is seen be labeled "B," it becomes possible to say that percepts reported by Ss tend to go from "A" to "B" without the intermediate step "AB."

Because our main hypothesis relates to relative perception of fusion and rivalry by prejudiced and nonprejudiced persons, the experimental situation in which we tested this assumption appears to be inappropriate. The same point holds for expected threshold differences because the late appearance of the second stimulus when the constancy effect operates makes it almost a mandatory function of structural predominance.

The relatively consistent trends (accounted for by some Ss) in differences of "fusion thresholds" between our two groups—which are consonant with our prediction—*imply a relationship between prejudice and perception in Ss whose perceptual response styles make such a relationship possible.*

This possibility raises the prospect of promise for future research into individual styles of response to the Engel Effect. In Ittelson and Seidenberg's study (5), individual styles are as much in evidence as in our experiments. Ardis and Fraser (2) found that extraverts maintain constancy effects better than do introverts, and other investigations have reported related findings linking perceptual responses and personality measures. It is thus possible that perceptual styles (with some Ss having consistently high or low thresholds and with some Ss going through many changes or few changes or no changes) are tied to personality variables, but may be subject to modification by social attitudes.

E. SUMMARY

In the two studies reported, we examine a hypothesized relationship between attitudes toward Negroes and a stereoscopic interracial-constancy effect. We find no statistically significant differences between the high-prejudice and low-prejudice groups in their readiness to perceive Caucasian and Negro faces. Trends observed in the data support previous findings that Ss high in prejudice tend to report more binocular rivalry and less binocular fusion when the stimulus material consists of biracial stereograms than do low-prejudiced Ss.

Because the constancy phenomenon evoked by the method of stimulus presentation works against the likelihood of reports of rivalry or fusion, our trends may assume greater proportions than one would otherwise assign to them.

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