

RECOGNITION FOR FACES OF OWN AND OTHER RACE¹

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Recognition for faces of persons of own and other race was explored in both black and white subjects at both a predominantly black and a predominantly white university. Ten stimulus photographs each of black and white males were selected from a pool of stimulus photographs for recognition. The d' measure defined by signal detection theory was used as an index of discriminability/acuity. White faces were found more discriminable than black faces, and subjects were found to have higher acuity for faces of own race. Questionnaire data suggested differential experience with persons of other race only for black subjects at the white university, and failed to show a relation of reported experience to recognition acuity. The hypothesis of greater heterogeneity of white faces was not tested.

The traveler's observation that "all those Orientals [Blacks, Arabs] look alike" has support in anecdote and presumption, but little in empirical research. Many studies have been done concerning perception of minority group membership or recognition of facial expression. Some of the latter have included recognition of facial expression in persons of race different from the perceiver. But few studies have centered on interethnic differences in mutual recognition (Howells, 1938; Seeleman, 1940).

A relative inability to recognize persons of another race, should it exist, would have obvious social implications including identification of persons and related legal questions. Among correlates of differential ability that would bear investigation are the distribution of experience with physiognomies of different types and its relation to physiognomic perception and recognition. Questions concerning cue utilization habits and their acquisition would become relevant and would lead to investigation of physiognomic experience as

a determinant of recognition, the amount of experience required for the ability to reach asymptote, and the ecology of physiognomic experience related to recognition ability. "Race" as used in this connection is merely a shorthand way of referring to differences in physiognomy that correlate with and are cues to the race of the stimulus person. The present study is an attempt to demonstrate differential recognition ability for faces of own and other race. A 2×2 (Race of Subject \times Race of Stimulus Person) factorial design was used, with race of stimulus person a repeated measure. Differential recognition ability would appear as the interaction effect.

METHOD

Subjects

Subjects were 26 students from introductory psychology courses at the University of Illinois (13 black, 13 white), and 14 first year graduate students at Howard University (7 black, 7 white). Subjects were paid for their participation.

Stimulus Photographs

Forty black and 40 white males of college age were photographed, and the photographs were used as stimuli. All photographs were taken with an Asahi Pentax Hv 35-millimeter camera with a lens of 210-millimeter effective focal length. Photographs were taken on Kodacolor-X negative film from a distance of 7 feet. Stimulus persons were instructed to look directly into the camera lens and assume a "neutral" expression. To reduce nonphysiognomic cues, stimulus persons wore a plain white T shirt and were photographed full face, facing the camera. The background in all photographs was a neutral surface of 90% reflectance. Illumination was provided by a Honeywell Strobonar Model 600. Ex-

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posure was determined by calculation. Black stimulus persons were given twice the exposure calculated for white stimulus persons. Color transparencies were made and served as the stimuli in the experiment.

Procedure

Subjects were seated in a room approximately $20 \times 30 \times 15$ feet high. Illumination was provided so that subjects could see the response sheet and perform the response task. Ten minutes adaptation was given in the experimental room. Subjects then heard the following instructions presented by tape recording.

The experiment you are participating in concerns the ability to recognize faces. You will be shown 20 close-up slides, 1 each, of 20 college age men. Each of the 20 slides will be on the screen for about 2 seconds. After you have seen the 20 slides we will mix them in with 60 more and then see if you can recognize the ones you saw before. All 80 will be shown one at a time.

You have in your hand a marking pen and a sheet of paper on which to mark your responses to each of the 80 pictures in the second series. If you recognize a picture, circle the word "yes" opposite its number. If you do not recognize a picture circle the word "no." Be sure to circle either "yes" or "no" for each picture before the next picture goes on the screen. Only circle "yes" if you are fairly sure you saw the picture before, in the first series.

The experiment is being conducted with pictures of different racial groups: black, white, and oriental. The pictures you will see today will be of young men of two of these racial groups.

Now we will show you the first series of pictures. They will appear on the screen rather rapidly, so be ready. Pay keen attention.

Following this the stimulus sequence was projected by a Kodak Carousel projector. Image size was approximately 32×48 inches. Subjects were seated at distances varying from 10 to 20 feet from the screen, in no case being displaced from the axis perpendicular to the image by more than 10 feet. Transparencies were projected for approximately $1\frac{1}{2}$ seconds, with an interstimulus interval of approximately $\frac{1}{2}$ second. The 20 stimulus transparencies were chosen randomly (10 from a pool of 40 white photos, 10 from a pool of 40 black photos) and sequenced randomly with the restriction that no more than three stimuli of given race could appear in sequence.

When the stimulus sequence had been shown, the following instructions were presented by means of the tape recorder:

Now we will show you the second series. There are 80 pictures in the series: the 20 you just saw and 60 others you have never seen before. Your task is to recognize the pictures you just saw. If you recognize a picture, circle the word "yes" opposite its number. Be sure that you mark "yes"

or "no" for each picture. If you do not make a mark for each picture, you will not be able to tell what number the pictures you recognize are, and will lose your place on the answer sheet. It is important that you keep up with the pace at which the pictures are shown, and mark one of the two responses for each and every picture. Circle "yes" if you are fairly sure you saw the picture before in the first series. Be careful.

The interval between the stimulus sequence and the beginning of the recognition sequence was 1 minute. The 40 black and 40 white stimulus photographs of the recognition sequence were randomly ordered with the restriction on succession noted above. Exposure duration during the recognition sequence was 4 seconds with a $\frac{1}{2}$ -second interstimulus interval. Following the recognition sequence, a questionnaire was administered to collect data concerning experience with the "other race." The experimenter at Illinois was white, and at Howard, black.

RESULTS AND DISCUSSION

Two measures of recognition were obtained: the number of correct identifications and the number of false identifications. These two measures are used to find the index d' . This index was derived in the context of signal detection theory (Swets, Tanner, & Birdsall, 1964) and discussed in the context of studies of short-term recognition memory by Bernback (1967). It is taken as a measure of either discriminability of a stimulus or the acuity of the perceiver, the two being confounded. d' is a measure indicating the superiority of performance over chance expectation where performance is a joint function of the probability of a correct response and the probability of a positive response in the absence of the stimulus (the guess rate). Values of d' for each subject were obtained from tables given by Elliot (1964).³ Analyses reported here use the square root of the d' measure obtained for each subject. This is done because of the nonlinearity of the d' scale, which is bounded at the lower end, but not at the upper end. The transformation does not effect the ordering of the group means, but does make the analysis more sensitive than

³ Another procedure of obtaining d' scores which yields more information than the "yes/no" procedure used here is described by Green and Moses (1966). Essentially their procedure allows gradations within the "yes" and "no" categories and thus can take account of information concerning the decision criterion used by subjects.

TABLE 1
MEANS AND STANDARD DEVIATIONS OF CORRECT RESPONSE,
FALSE IDENTIFICATIONS, AND $\sqrt{d'}$ MEASURES

University	Ss	Stimuli					
		Black			White		
		Correct responses	False identifications	$\sqrt{d'}$	Correct responses	False identifications	$\sqrt{d'}$
Illinois	Black	7.38 ^a	5.69	1.314 ^a	6.77	3.61	1.345
	(<i>n</i> = 13)	1.39 ^b	3.75	.325	1.88	2.56	.272
	White	6.08	4.85	1.085	7.92	3.46	1.463
Howard	(<i>n</i> = 13)	1.91	3.00	.383	1.19	2.07	.297
	Black	6.14	2.43	1.391	7.14	3.00	1.416
	(<i>n</i> = 7)	2.61	2.37	.406	1.77	2.31	.325
	White	5.57	5.86	.990	6.14	2.14	1.303
	(<i>n</i> = 7)	1.81	2.12	.256	1.77	1.86	.499

^a Means.
^b Standard deviations.
^c Mean $\sqrt{d'}$ scores were obtained by first calculating the square root of individual subjects d' score and then calculating group means on these roots.

would be true in the case of the nontransformed d' scale. All differences between the Illinois and Howard samples are richly confounded, so their data will be reported and analyzed separately.

Means and standard deviations for the three measures are presented in Table 1. A 2×2 analysis of variance (fixed-effects

TABLE 2
ANALYSIS OF $\sqrt{d'}$ MEASURE FOR BLACK AND WHITE
SUBJECTS EXPOSED TO BLACK AND WHITE STIMULI
AT BLACK AND WHITE INSTITUTIONS

Source	<i>df</i>	<i>MS</i>	<i>F</i>
Illinois Ss			
Between Ss	25		
Race of <i>S</i> (A)	1	.0393	.2905
Ss within groups	24	.1353	
Within Ss	26		
Race of stimulus (B)	1	.9727	13.435**
A × B	1	.3912	
B × Ss within groups	24	.0724	
Howard Ss			
Between Ss	13		
Race of <i>S</i> (A)	1	.3566	2.525
Ss within groups	12	.1412	
Within Ss	14		
Race of stimulus (B)	1	.2880	5.323*
A × B	1	.2161	
B × Ss within groups	12	.0541	

* $p < .05$.
** $p < .01$.

model) with repeated measures (race of stimulus) was performed. The analysis of variance for the two samples is summarized separately in Table 2. A main effect for race of stimulus is observed in the data for both samples, white stimuli being recognized more than black stimuli. This finding may reflect differences in distinctiveness of the stimuli and should lead to investigation of the dimensionality of faces of the two races, along with the variation on these dimensions normally seen. The finding may also reflect brightness differences in the stimulus photographs. A hypothesis that black faces are more homogeneous than white faces is consistent with the present data, if it could be shown that the stimulus samples are not differentially biased samples of their respective physiognomic populations. Independent specification of physiognomic homogeneity is required as a test of this hypothesis. Also consistent with this finding is the hypothesis that the distribution of social experience is such that both black persons and white persons will have had more exposure to white faces than black faces in public media and also will have had more contact with white persons where discriminative ability has positive motivational value.

The Race of Subject \times Race of Stimulus interaction, such that subjects recognize faces of own race better than faces of other race, ap-

pears in the Illinois data at a conventionally acceptable significance level, and at a marginal level in the Howard data. The authors interpret the findings as indicating a Subject \times Stimulus interaction, the marginal level of the findings attributed to sample size. The findings in the Howard sample of superiority of black subjects with white faces is unexpected. This finding disappears, however, if one white subject with distinctly deviant scores is eliminated from the analysis. The order of $\sqrt{d'}$ means then becomes: white subjects, white stimuli, 1.44; black subjects, white stimuli, 1.41; black subjects, black stimuli, 1.39; white subjects, black stimuli, 1.07—the same order as in the Illinois sample. A parallel analysis based on d' scores fails to show any significant effects in the Howard data, while showing both the stimulus main effect ($p < .05$) and the Race of Subject \times Race of Stimulus interaction ($p < .025$) in the Illinois data.

In order to provide a check on the possibility that the results were specific to the particular stimulus photographs used, data was collected from three additional groups of subjects, each group being exposed to a set of stimulus pictures different from each other and from those used in the first experiment. The recognition pool remained the same but was reordered. Procedures were identical to those described for the first experiment. Because of availability, the present experiment was restricted to white subjects at the University of Illinois. Subjects participated in the study as part of a course requirement. The analysis of variance is summarized in Table 3.

The superiority of white subjects with white faces as compared with black faces is strongly borne out with all stimulus sets. While this finding is expected on the basis of both the interaction and main effect found in the first experiment, no effect due to stimulus set and no interaction with stimulus set was found.

A third experiment was carried out to investigate the generality of the findings to similar experimental tasks. Specifically, the question was whether intermixing of black and white stimuli for white subjects in the first

TABLE 3

ANALYSIS OF VARIANCE OF $\sqrt{d'}$ MEASURE FOR WHITE SUBJECTS AT A WHITE INSTITUTION EXPOSED TO ONE OF THREE SETS OF BLACK AND WHITE FACES

Source	df	MS	F
Race of stimuli (A)	1	1.5333	13.73*
Stimulus set (B)	2	.3332	2.98
A \times B	2	.1056	
Within cell	114	.1117	

* $p < .001$.

experiment would yield results comparable to those obtained when white subjects were given either black or white stimuli only. Procedures were identical to those in the previous experiments with the exception that there were 20 stimuli of one race only and the recognition pool contained 40 stimuli of the same race. Subjects were from the same population as subjects in the second experiment. Three different stimulus sets and orders were used. An analysis of variance (Race of Stimulus \times Stimulus Set) was performed and is presented in Table 4. Again, the effect of race of stimulus is clear with no effect of stimulus set or Stimulus Set \times Race of Stimulus interaction.

The findings are consistent with a hypothesis of differential experience with persons of other race and differential acquisition of cue utilization habits. If physiognomic discriminations among persons of other race are frequently made, within-group discriminative cue utilization habits will be formed. If contrasts of persons of other race from own race are predominant, between-group (contrasting) cue utilization habits will be formed. The latter may operate to decrease use or

TABLE 4

ANALYSIS OF VARIANCE OF $\sqrt{d'}$ MEASURE FOR WHITE SUBJECTS AT A WHITE INSTITUTION EXPOSED TO ONE OF THREE SETS OF BLACK OR WHITE FACES

Source	df	MS	F
Race of stimulus (A)	1	1.5767	20.719*
Stimulus set (B)	2	.0761	1.000
A \times B	2	.0219	
Within cell	113	.0761	

* $p < .001$.

acquisition of the former. One form of the differential experience hypothesis is that experience (in general) with persons of other race is related to physiognomic recognition ability, until experience is sufficient to bring recognition ability to asymptote. Another form suggests differences in the importance of various types of physiognomic experience, such that experience occurring when physiognomic discriminations are of instrumental value are more important than other forms, such as "mere" exposure.

Questionnaire data collected in the present study bears on the first form of the differential experience hypothesis. A positive relation should exist between a measure of experience with other race and recognition for other race faces. The questionnaire asked about the number of other-race persons of various roles and occupational categories encountered in the course of an average week's time. This number and the number identified as persons known by first name (reciprocally) was added to a score obtained by inquiring about the number of other-race persons in various capacities in the subject's school classes from elementary to secondary school.

While Illinois black subjects reported more experience with persons of other race than did white subjects (median test, $X^2 = 5.538$,

$p < .02$, using Yates correction), the Howard data did not show this difference. Further, median tests showed no relation between the experience index or any of its components and recognition for either group of subjects at both universities. These are weak tests of the differential experience hypothesis, however, and the number of cases is small. Hypotheses that factors other than experience mediate the acuity findings should be entertained.

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