Percentage Estimates of Positive and Negative Traits Within a Population as a Function of Attitude Toward the Population, Trait Content, and Actual Distribution of Traits Within the Population

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Percentage Estimation of Positive and Negative Traits Within a Population as a Function of Attitude Toward the Population, Trait Content, And Actual Distribution of Traits Within the Population

by

Marsha Linehan

A Thesis Submitted to the Faculty of the Graduate School of Loyola University of Chicago in Partial Fulfillment of the Requirements for the Degree of Master of Arts June, 1970
LIFE

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ABSTRACT

The effect of relative racial attitudes on estimates of the percentages of positive and negative traits within a Negro and white stimulus population was tested. A factorial design was used with repeated measures on two of three factors. The factors were as follows: 1) attitude toward members of the stimulus population (pro-white, middle, pro-Negro); 2) traits attributed to members of the stimulus population (smart-dumb, clean-dirty, hardworking-lazy); 3) distribution of the traits within the stimulus population (racial equality, whites superior, Negroes superior). The subject's task was to estimate the percentage of Negroes and whites with positive and negative traits in each of nine stimulus populations. The four estimates in each problem were combined in three different ways giving dependent measures of 1) pro-white bias, 2) positive-trait bias, and 3) white-overpopulation bias. The prediction that subjects with a pro-Negro attitude would bias the estimates in favor of Negroes and that pro-white subjects would do just the opposite received only limited support. It was suggested that this lack of relationship may have been due to an inadequate measure of attitude. A significant effect of attitude on estimation of positive-trait persons irrespective of race was found. There was a tendency across all subjects to bias the
estimates in favor of whites. This tendency seemed to be most
pronounced in the Negro superior problems and in problems where
the trait content was clean-dirty. There was also some support
for inferring that whites were reluctant to view Negroes as
lazy. These findings suggested that a subject would be more
prone to infer a relationship between race and trait when the
relationship is favorable to whites. A tendency to equalize
distributions, however, seems to indicate that subjects would
be reluctant to infer any strong correlation between race and
trait.
Percentage Estimation of Positive and Negative Traits
Within a Population as a Function of Attitude Toward the Population, Trait Content, And Actual Distribution of Traits Within the Population
Marsha Linehan
Loyola University of Chicago

CHAPTER I: INTRODUCTION

The term "prejudice" is frequently defined simply as a negative attitude towards an ethnic group. (In popular usage the group is most commonly assumed to be the Negro race.) Broadening the concept somewhat, a number of writers have proposed definitions based on the norm of rationality (Powdermaker, 1944; Lippit and Radke, 1946; Allport, 1954; Kelman and Pettigrew, 1959; Simpson and Yinger, 1965). In summing up this view, Harding, Proshansky, Kutner, and Chein (1969, p. 5) state that "Prejudice in the sense of deviation from the norm of rationality may occur in the form of hasty judgment or prejudgment, overgeneralization, thinking in stereotypes, refusal to modify an opinion in the face of new evidence, and refusal to admit or take account of individual differences." In the case of anti-Negro prejudice, Woodmansee and Cook (1967) found the holding of derogatory beliefs to be one of the six item clusters.
which most adequately differentiated members of pro-Negro and anti-Negro organizations. From this it can be inferred that basic to these processes of overgeneralization and stereotyping, is the tendency to attribute specific traits to all members of a particular ethnic group. Since the holding of derogatory beliefs can be understood to include the assignment of negative traits, anti-Negro prejudice can be at least partially described as the belief that there is a high correlation between a person's race (in this case Negro) and the presence of negative traits. Conversely, a person who has a favorable attitude towards a group (called "love prejudice" as opposed to "hate prejudice" by Allport, 1954) could be expected to believe that membership in the ethnic group is highly correlated with possession of positive traits.

The concept of correlation when drawn from one's own experience depends on the estimation of frequencies. Specifically in the case of stereotyping and overgeneralizing, it involves the categorization of events as conforming or not conforming to an hypothesis of equivalence: trait = race, i.e., trait and race are either both present or both absent. Smedslund (1963) studied the concept of correlation in adults and found that persons with no statistical training had no adequate concept of correlation. Instead, he found a tendency to depend
exclusively on the frequency of the ++ cases (e.g., trait and race both present) in judging relationships. It is evident then that even in subjects with no concept of how to arrive at a degree of correlation (of 19 subjects, ten had never heard of the concept and six had encountered the word but never had it explained) estimates of relationship are based on frequency and/or proportion estimates. It can therefore be inferred that insofar as the stereotypes and overgeneralizations characteristic of prejudice are based on explicit or implicit correlational beliefs, the ability to correctly estimate proportions (or percentages) of group members and non-members both possessing and not possessing the trait(s) in question is important in both prejudice development and change.

The present study is concerned with the effect of already existing attitudes on deviations from the norm of rationality in the form of refusal to modify an opinion in the face of new evidence. Specifically it is concerned with the effects of both "hate prejudice" and "love prejudice" on estimates of the percentages of positive and negative traits within a Negro and white stimulus population.

Although the effects of attitude on estimates of numbers (numerousness) has been a largely neglected problem, there is considerable evidence that values and attitudes play an important
part in both perception and memory. A tendency to produce more food responses and to recognize food related words quicker when hungry than when satiated (at least for moderate levels of hunger) was found by Levine, Chein, and Murphy (1942), McClelland and Atkinson (1948), and Wispe and Drambarean (1953). It has also been found that stimuli recently associated with rewards are more salient and more readily perceived than stimuli associated with failure (Proshansky and Murphy, 1942; Schafer and Murphy, 1943; Sommer, 1957). Similarly, when stimuli are made noxious by prior association with electric shock, recognition is impaired (Rosen, 1954; Dulany, 1957; McNamara, Solley and Long, 1958; Lowenfeld, 1961; Hochberg and Brooks, 1958). Secord, Bevan and Katz (1956) found that high prejudiced subjects showed a greater tendency than low prejudiced subjects to exaggerate differences between Negroes and whites in physical characteristics correlated with race. Taken together these studies seem to indicate that at least for those instances when accurate perception is not required for immediate action (a condition met by the above) persons tend to either distort or select their perceptions in the direction of "seeing what they want to see."

With respect to the effect of attitude on memory, findings
are similar. In general it can be said that unless a person is specifically motivated to do otherwise, there seems to be a general tendency to selectively remember ideas and statements which maintain his attitude unchanged. Recall, therefore, tends to be best for both supportive ideas and for those non-supportive ideas which are, at least from the person's point of view, easily refutable (Levine and Murphy, 1943; Jones and Aneshansel, 1956; Jones and Kohler, 1958; Feather, 1969a, 1969b, 1969c). It should be noted here that some studies have not found this effect of attitude (Waly and Cook, 1966; Greenwald and Sakumura, 1967). In studies varying pay-off value for recalling occurrence of letters of the alphabet, Taub (1965) and Christ (1967) found better recall for high value stimuli than for low value stimuli. Christ and Teichner (1967), however, replicated the studies using more realistic elements and found no difference between the high and low value conditions.

On the basis of these studies one would expect a person to more readily perceive and remember positive traits in a positively valued race (object of "love prejudice") while perceiving negative traits more readily in a negatively valued race (object of "hate prejudice"). On the basis of Secord, Bevan and Katz' work and other studies showing an accentuation of
difference between stimuli falling into different classes (Tajfel, 1959) one could further expect that when members of these two races are seen together perception and recall of differences between them on negative and positive traits will be distorted and accentuated with the low value group perceived as more toward the negative extreme and the high value group as more toward the positive extreme.

It should be noted that although accurate estimations of percentages of elements falling into various trait-race categories depends on accurate perception (and memory, when estimation occurs after the elements are removed), it also requires the subject to go a step further and judge how many elements in one category were perceived relative to the number perceived in other categories. There is considerable evidence that number estimations are strongly influenced both by the absolute magnitude and by the relative magnitude of the number. With the exception of Mann and Taylor (1969) who found an effect of position on estimation of the number of persons ahead, guidelines for predicting direction of distortion must be found in the psychophysical literature.

A general tendency to overestimate low values and underestimate high values has been reported by Erlick (1964), Howel and Funaro (1965), Preston and Baratta (1948), and Jamison and
Kozielecki (1968). A related tendency to overestimate the number of small objects and underestimate the number of large objects was found by Miller and Baker (1968). Bevan and Turner (1964) found that when identified as part of the figure a large frame resulted in underestimation. Insofar as the relative area of dots is small within the large frame, this fits in with the other studies. Similar results were also obtained by Bevan, Maier, and Helson (1963). Smedslund (1963), however, using meaningful stimuli found no unambiguous relationship between tendencies to over- and underestimate and relative frequency of event category.

The finding of Smedslund ties in with the previous findings of Christ and Teichner and suggests that when the subject's task is to remember whether an event occurred or not (and in Smedslund's task to also count the frequency of occurrence) the effects of both value and relative magnitude of the elements is less (or non-existent) for meaningful elements than for non-meaningful elements (dots, etc.). A further prediction therefore is that although effects of true magnitudes on percentage estimates of positive and negative traits as attributed to members of a biracial population may occur, they will not be of sufficient strength to mask the effects of attitudes toward the two races.
In previous research on effects of ethnic attitudes on perception and recall, the independent measure has typically been the subject's score on a test of prejudice towards the ethnic group of which the subject is not a member. This is entirely valid in research aimed at establishing differential responses toward members of or stimuli related to the other ethnic group. However, when the aim of the research includes an attempt to assess responses to members of a subject's own group versus responses to members of another group it would seem that the subject's attitude toward his own race is relevant. A clear-cut and steady increase in preference for white friends over Negro friends among whites has been reported among young children (Landreth and Johnson, 1953; Stevenson and Stewart, 1958; Morland, 1962) through high school students (Horowitz, 1936). However, these studies were done before the current black power and black separatist movements began and also somewhat before the upsurge in awareness among white college students of the racism embedded in much of "white" America. Consequently it was thought that the assumption that all whites have a positive attitude towards their own race is a tenuous assumption at best. There also seems to be no a priori reason for believing that a person's attitude toward one race is negatively correlated with his attitude toward another race. For these reasons, it was decided to compute a measure of
relative racial attitude by subtracting the subject's attitude toward Negroes from his attitude toward whites.

CHAPTER II: METHOD

Overview.—A factorial design was used with repeated measures on two of three factors. The factors were as follows:
1) attitude toward members of the stimulus population (pro-white, middle, pro-Negro); 2) traits attributed to members of the stimulus population (smart-dumb, clean-dirty, hardworking-lazy); 3) distribution of the traits within the stimulus population (whites equal to Negroes in percentage of positive and negative traits, whites higher than Negroes in percentage of positive traits but lower in percentage of negative traits, Negroes higher than whites in percentage of positive traits but lower in percentage of negative traits). The subject's task was to estimate the percentage of Negroes and whites with positive and negative traits in each of nine stimulus populations. The four estimates in each problem were combined in three different ways giving dependent measures of 1) pro-white bias, 2) white over-population bias, and 3) positive trait bias. Following the task, attitudes toward whites and Negroes were measured with the semantic differential.
Subjects.--The subjects were 125 white Loyola undergraduates fulfilling part of the requirements of a course in introductory psychology. The number of males and females was approximately equal. Black students who signed up for the experiment were run although their scores were not included in the analyses. Subjects were run in groups of ten with assignment to groups determined by order of sign-up for the experiment. Three subjects were dropped due to failure to complete one or more of the problems.

Experimenters.--There were three experimenters, two females and one male. The two female experimenters were white graduate students and the male was an undergraduate senior. Each ran approximately one third of the subjects.

Task Materials.--Task materials consisted of nine decks of 40 10mm. by 15mm. index cards each. On all cards either the word NEGRO or the word WHITE was typed on the upper half. Within each deck there were 20 NEGRO cards and 20 WHITE cards. Typed on the lower half of each card was either the word SMART or DUMB (three decks), the word CLEAN or DIRTY (three decks), or the word LAZY or HARDWORKING (three decks). Type was .5mm. Roman letters. Within each deck there were 20 positive trait
cards (SMART, CLEAN, HARDWORKING) and 20 negative trait cards (CUMB, DIRTY, LAZY). Cards within each deck were randomized separately. All subjects got the same random orders.

Each deck of cards fell into one of the following conditions depending on the distribution of positive and negative traits between the two races; 1) whites equal to Negroes in number of positive and negative traits (three decks), 2) whites higher than Negroes in percentage of positive traits but lower in number of negative traits (three decks), 3) Negroes higher than whites in number of positive traits but lower in percentage of negative traits (three decks). These conditions are referred to as racial equality, white superior, and Negro superior respectively in the remainder of the papers. (See Table 1 for distributions.)

Table 1

Percentage Distributions Within Decks

<table>
<thead>
<tr>
<th>Race</th>
<th>Racial Equality Decks</th>
<th>White Superior Decks</th>
<th>Negro Superior Decks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traits</td>
<td>Traits</td>
<td>Traits</td>
</tr>
<tr>
<td></td>
<td>Positive Negative</td>
<td>Positive Negative</td>
<td>Positive Negative</td>
</tr>
<tr>
<td>White</td>
<td>25% 25%</td>
<td>37.5% 12.5%</td>
<td>12.5% 37.5%</td>
</tr>
<tr>
<td>Negro</td>
<td>25% 25%</td>
<td>12.5% 37.5%</td>
<td>37.5% 12.5%</td>
</tr>
</tbody>
</table>
At the end of each deck was a card with four questions asking the subject to estimate the percentages of white negative cards, white positive cards, Negro positive cards and Negro negative cards. The four questions were in a different random order for each problem but were the same over subjects. At the beginning of each deck was a card giving instructions for the problem. Subjects were instructed to look at each card in the deck once and then put it on the bottom of the deck. Cover stories saying that the cards represented persons in a real population and explaining how the "data" was collected were also included on each instruction card. Three different cover stories were used, one for each of the trait areas.

To eliminate as far as possible subject-experimenter interaction during the experiment and to enable individual subjects to work at their own pace, all nine decks were given to the subject at the beginning of the experiment. A problem box was constructed by inserting index markers at one inch intervals in a 16.5mm. by 35mm. cardboard box. The markers were labeled from one to nine consecutively and the appropriate problem deck was inserted in front of each marker. Order of the problems was random and was the same for all subjects. (See Appendix A
for the exact order.)

On the front of the problem box a pocket was made with construction paper and a general instruction card was inserted. An overall cover story stating that the task was a test to see how well people estimate percentages on the basis of first impressions was included on the card as well as task instructions. Instructions and card decks were ordered so that at the beginning of each deck subjects were told what to do with that particular deck and at the end of each deck they were told to replace the deck and pick up the next. (See Appendix B for exact wording of the instruction cards and the percentage estimation cards.)

Attitude Measure.--Subjects rated a number of American ethnic groups using the standard instructions and format of the semantic differential. Among the groups rated were the Negro American and the White American. They rated these groups on ten seven-step bipolar adjective scales. The measure of attitudes was based on responses to the following five scales: good-bad, valuable-worthless, fair-unfair, pleasant-unpleasant, clean-dirty. These scales have been shown to be high on the evaluative dimension and to correlate highly with Thurstone's measure of anti-Negro prejudice (Osgood, Suci, and Tannenbaum, 1957). Responses on each scale were scored from one to seven in the direction of positive evaluation and summed to give a range of possible scores from 5 to 35. In order to obtain a
measure of preference for one race relative to the other, the Negro American score was subtracted from the White American score giving a range of possible scores from -35 to +35. (This score was utilized in all further analyses.) Thus, a positive score indicates a preference for whites over Negroes, a negative score indicates a preference for Negroes over whites, and a score of zero indicates no preference for one over the other. The remaining five bipolar adjective scales were included as filler items. The order of the group concepts was the same for all subjects except that for half the subjects the American Negro concept preceded the American White concept and for the other half the order was reversed. Bipolar adjective scales for the first race concept (American Negro for half and American White for the other half) were in identical random order. A different random order was used for the second race concept. Orders were randomized for each of the other concepts separately and were constant across subjects.

The semantic differential instructions and scales were typed on 10mm. by 15mm. index cards and were inserted in the problem box immediately following the last percentage estimation problem. The index marker was labeled "Group Impression" and a cover story included on the instruction card indicated that it was a test to measure first impressions of groups. (See
Appendix B for the exact wording.)

Procedure.--All subjects upon entering the experimental room were seated at a large table. In front of each subject was a problem box. The experimenter told the subjects that the experiment was an attempt to measure how people make first impressions. A few comments were made about the importance of first impressions in everyday life. In order to discourage subjects from trying to memorize and count the cards, comments were made regarding the quickness of most first impression formation. Subjects were told that all necessary instructions for the first impression tasks were contained in the problem box and were instructed to raise their hand for help if at any time during the experiment they did not understand what they were to do. Subjects were told to begin by picking up the first instruction card. Subjects went through the nine problem decks and one semantic differential deck at their own rate and left when they were finished.

Dehoaxing was not done as it was felt by the experimenter that informing the subjects that the true nature of the experiment was to assess their attitudes and the effect of their attitudes on their estimates might tend to cause many of them to worry about what kinds of estimates they put down. The probability that some would come to negative self-evaluations seems to justify the continued deception.
CHAPTER III: RESULTS

Data was available from 128 subjects. The total distribution of attitude scores was divided into three groups with approximately one fifth of the subjects in each of the two extreme groups and the remaining three fifths in the middle. The range of scores was from -12 to +26 with a negative score signifying a greater preference for Negroes than for whites and a positive score signifying a greater preference for whites than for Negroes. Cutting points for attitude classification were as follows: Pro-Negro, below 0; Middle, 0 to 7; Pro-white, above 7. Three subjects did not complete one or more of the problems and were deleted leaving n's of 27, 73 and 25 for the pro-Negro attitude, middle attitude, and pro-white attitude groups respectively. Of the remaining 125 subjects 26 made errors such that the sum of the percentages for a problem did not equal 100%. Since the subjects making errors were not evenly distributed over the three attitude levels (14.8%, 19.2%, and 32.0% of the pro-Negro attitude, middle attitude, and pro-white attitude groups respectively made errors) the estimates were corrected by adding one fourth of the amount needed to each estimate in the problem. Thus the relations among the estimates were not disturbed and these subjects were included in the sample.
Analysis of Four Percentage Estimates

In order to standardize scores across problem types having different frequency distributions, estimate error scores were computed by subtracting the true percentage from the estimated percentage for each of the four percentage estimations per problem. Thus a positive score signifies a percentage overestimation and a negative score signifies a percentage underestimation. These error scores were used in the next step of analysis.

Since within each problem the estimates for the white positive, white negative, Negro positive, and Negro negative categories had to sum to 100%, estimates were not independent of each other. This is intuitively obvious when one considers that if a subject made an error on one estimate he had to compensate for this by making an error in the opposite direction on one or more of the remaining three estimates. Thus, estimate error scores for each problem over all subjects by necessity had to sum to zero.

A derived set of variables that are uncorrelated, however, can be obtained by means of factor analysis. The method of principal components (Harman, 1959) was used in order to obtain computable as opposed to estimated component scores. In this sense, the four estimate-error variables white positive, white
negative, Negro positive, Negro negative can be seen as occupying a space with the number of dimensions determined by the rank of the covariance matrix for the original estimate errors. Thus, the initial set of observations can be completely represented by a set of component scores, which are uncorrelated and uniquely defined. This latter property is due to the fact that a principal component analysis yields a first component of maximum variance, a second with the next largest variance, but orthogonal to the first, etc. From another point of view, the first component reflects the over- and underestimation tendencies which account for the largest amount of variance. Table 2 gives the correlation matrix (R_x), eigenvalues, and eigenvectors for the four estimate-error variables.

Table 2

1. Correlation Matrix for Mean Scores On Four Percentage Estimates*

<table>
<thead>
<tr>
<th>Estimates</th>
<th>White Positive</th>
<th>White Negative</th>
<th>Negro Positive</th>
<th>Negro Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Positive</td>
<td>1.00000</td>
<td>-.78366</td>
<td>-.28910</td>
<td>-.07373</td>
</tr>
<tr>
<td>White Negative</td>
<td>1.00000</td>
<td>.01594</td>
<td>-.17165</td>
<td></td>
</tr>
<tr>
<td>Negro Positive</td>
<td></td>
<td></td>
<td>1.00000</td>
<td>-.66996</td>
</tr>
<tr>
<td>Negro Negative</td>
<td></td>
<td></td>
<td></td>
<td>1.00000</td>
</tr>
</tbody>
</table>

*Means based on sum of nine problems per subject.
2. Eigenvalues

|       | 1.94531 | 1.52884 | .52585 | .00000 |

3. Eigenvectors

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>.56891</td>
<td>-.43002</td>
<td>.40830</td>
<td>-.56983</td>
</tr>
<tr>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>-.55089</td>
<td>.42731</td>
<td>.49812</td>
<td>-.51556</td>
</tr>
<tr>
<td>Negro</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>-.46723</td>
<td>-.52421</td>
<td>-.54328</td>
<td>-.46015</td>
</tr>
<tr>
<td>Negro</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>.39314</td>
<td>.59807</td>
<td>-.53853</td>
<td>-.44469</td>
</tr>
</tbody>
</table>

Vector Labels: I = pro-white bias, II = positive-trait bias, III = white-overpopulation bias

From this it can be seen that correlations between white positive and white negative estimate errors and between Negro positive and Negro negative estimate errors are both high, negative and almost equal. Correlations between white positive and Negro positive estimate errors and between white negative and Negro negative estimate errors are low, negative and almost equal. Correlations between white positive and Negro negative and between white negative and Negro positive estimate errors are both near zero. Looking at the covariance matrix (Table 3, part 1) the pattern of similarities noted above for the correlation matrix is the same and approximates quite closely the patterned covariance matrix in Table 3, part 2.
### Table 3

1. Covariance Matrix for Mean Scores on Four Percentage Estimates

<table>
<thead>
<tr>
<th>Estimates</th>
<th>White Positive</th>
<th>White Negative</th>
<th>Negro Positive</th>
<th>Negro Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Positive</td>
<td>11.48709</td>
<td>-8.14419</td>
<td>-2.68236</td>
<td>-0.66097</td>
</tr>
<tr>
<td>White Negative</td>
<td></td>
<td>9.40222</td>
<td>0.13376</td>
<td>-1.39226</td>
</tr>
<tr>
<td>Negro Positive</td>
<td></td>
<td></td>
<td>7.49442</td>
<td>-4.94439</td>
</tr>
<tr>
<td>Negro Negative</td>
<td></td>
<td></td>
<td></td>
<td>6.99709</td>
</tr>
</tbody>
</table>

2. Equipredictability Covariance Pattern

\[
\begin{pmatrix}
\sigma^2 & \sigma_{12} & \sigma_{13} & \sigma_{14} \\
\sigma_{12} & \sigma^2 & \sigma_{13} & \sigma_{14} \\
\sigma_{13} & \sigma_{14} & \sigma^2 & \sigma_{12} \\
\sigma_{14} & \sigma_{12} & \sigma_{13} & \sigma^2 \\
\end{pmatrix}
\]

3. Principal Component Structure

<table>
<thead>
<tr>
<th>Variance</th>
<th>Component Direction Cosines</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\sigma^2 + \sqrt{12} + \sqrt{13} + \sqrt{14})</td>
<td>[\begin{bmatrix} 1 &amp; -1 &amp; -1 &amp; 1 \end{bmatrix}]</td>
</tr>
<tr>
<td>(\sigma^2 + \sqrt{12} - \sqrt{13} - \sqrt{14})</td>
<td>[\begin{bmatrix} 1 &amp; -1 &amp; 1 &amp; -1 \end{bmatrix}]</td>
</tr>
<tr>
<td>(\sigma^2 - \sqrt{12} + \sqrt{13} - \sqrt{14})</td>
<td>[\begin{bmatrix} 1 &amp; 1 &amp; -1 &amp; -1 \end{bmatrix}]</td>
</tr>
<tr>
<td>(\sigma^2 - \sqrt{12} - \sqrt{13} + \sqrt{14})</td>
<td>[\begin{bmatrix} 1 &amp; 1 &amp; 1 &amp; 1 \end{bmatrix}]</td>
</tr>
</tbody>
</table>

\[p = 0.5\]
Such matrices (called equipredictability covariance patterns) have the property that the four multiple correlation coefficients of one variable with the remaining three are equal (Bargman, 1957). A matrix of this form, under pre- and post-multiplication by the orthogonal matrix P (Table 3, part 3), will reduce to its diagonal form. Note that P gives the four orthogonal contrasts in the 2 x 2 factorial experimental design. Bock (1960) has shown that if the hypothesis that the off-diagonal elements of the transformed sample matrix are zero in the population is confirmed, then the covariation of any pair of scores can be explained in terms of the shared common components associated with ways of classifying the tests. These components can be named and interpreted in terms of the contrasts in the factorial design. A likelihood ratio test given by Wilk's Criterion and Bartlett's approximation for moderate to large samples (as outlined by Bock) were performed to test whether the off-diagonal elements of the transformed sample matrix \( \Sigma_y \) given in Table 4 differ from zero. Since the scores were constrained to sum to zero in the sample, \( p_4 \) was deleted from the orthogonal matrix P. The test (called a structural analysis) did not reach significance and the assumption that the composition of the scores specified by the equipredictability covariance matrix is correct was not rejected.
Table 4

Covariance and Correlation Matrices for Mean Scores on Three Contrast Variables (Transformed Matrices)

1. Covariances ($\Sigma_y$)

<table>
<thead>
<tr>
<th>Contrasts</th>
<th>pro-white bias</th>
<th>positive-trait bias</th>
<th>white-over population bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>pro-white bias</td>
<td>17.16420</td>
<td>3.16645</td>
<td>1.29060</td>
</tr>
<tr>
<td>positive-trait bias</td>
<td></td>
<td>13.61580</td>
<td>.79425</td>
</tr>
<tr>
<td>white-over population bias</td>
<td></td>
<td>4.60182</td>
<td></td>
</tr>
</tbody>
</table>

2. Correlations ($R_y$)

<table>
<thead>
<tr>
<th>Contrasts</th>
<th>pro-white bias</th>
<th>positive-trait bias</th>
<th>white-over population bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>pro-white bias</td>
<td>1.000</td>
<td>.194</td>
<td>.145</td>
</tr>
<tr>
<td>positive-trait bias</td>
<td></td>
<td>1.000</td>
<td>.100</td>
</tr>
<tr>
<td>white-over population bias</td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
</tbody>
</table>

Due to the close approximation of the obtained covariance matrix to the equipredictability covariance pattern, contrast scores were computed using weights of .5. Three contrast scores were computed for each problem corresponding to the
vectors $p_2$, $p_3$, and $p_4$ of $P$. The first component, labeled pro-white bias, accounts for approximately 49% of the variance, the second component, labeled positive-trait bias, accounts for approximately 38% of the variance and the third component, labeled white over-population bias accounts for the remaining 13% of the variance. Because the covariance matrix for the four percentage estimates is of rank 3, all of the original variance is accounted for by the three derived mutually orthogonal contrast variables, i.e., $\text{tr} \left( \Sigma_y \right) = \text{tr} \left( \Sigma_x \right)$. ($\Sigma_y$ is presented in Table 4, part 1.) Since the contrast scores thus derived can, on the basis of the non-rejection of the assumption that $\Sigma_y$ is diagonal and under the assumption that the contrast variables follow a multivariate normal distribution, be regarded as statistically independent of each other, a separate analysis of variance for three factors with repeated measures on the last two factors (Winer, p. 319) was carried out for each variable. For each analysis, a matrix of covariances of the repeated measures within each of the populations was computed. Inspection of these matrices indicated that the assumptions underlying the repeated measures analysis of variance (as outlined by Winer, p. 371) appeared to be satisfied for all three variables.
Analysis of Variance for Pro-White Bias Contrast

Table 5 presents the mean scores for pro-white bias in relation to relative attitudes toward Negroes and whites.

Table 5

Mean Scores for Problems (3) in Relation to Trait Contents (3) on pro-white Bias, Positive-trait Bias and White-overpopulation Bias

<table>
<thead>
<tr>
<th>Problem Distribution</th>
<th>Trait Content</th>
<th>Pro-White Bias Contrast</th>
<th>Positive Trait Bias Contrast</th>
<th>White-overpopulation Bias Contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Racial Equality</td>
<td>Smart-Dumb</td>
<td>.300</td>
<td>1.996</td>
<td>- .240</td>
</tr>
<tr>
<td></td>
<td>Clean-Dirty</td>
<td>5.132</td>
<td>1.640</td>
<td>.700</td>
</tr>
<tr>
<td></td>
<td>Hardworking-Lazy</td>
<td>-2.364</td>
<td>2.060</td>
<td>- .312</td>
</tr>
<tr>
<td>White Superior</td>
<td>Smart-Dumb</td>
<td>-1.712</td>
<td>.816</td>
<td>.020</td>
</tr>
<tr>
<td></td>
<td>Clean-Dirty</td>
<td>-5.224</td>
<td>2.864</td>
<td>2.908</td>
</tr>
<tr>
<td></td>
<td>Hardworking-Lazy</td>
<td>-.916</td>
<td>6.412</td>
<td>3.128</td>
</tr>
<tr>
<td>Negro Superior</td>
<td>Smart-Dumb</td>
<td>9.352</td>
<td>3.996</td>
<td>-1.028</td>
</tr>
<tr>
<td></td>
<td>Clean-Dirty</td>
<td>4.320</td>
<td>2.556</td>
<td>.484</td>
</tr>
<tr>
<td></td>
<td>Hardworking-Lazy</td>
<td>.508</td>
<td>2.268</td>
<td>- .376</td>
</tr>
</tbody>
</table>

Since each score as noted above was computed according to the following linear combination, pro-white bias = .5(white positive estimate error + Negro negative estimate error) - .5(white negative estimate error + Negro positive estimate error), a
positive score reflects an overestimation of positive-trait whites and negative-trait Negroes (taken as a group) and an underestimation of negative-trait whites and positive-trait Negroes taken as a group. This analysis therefore serves as a test of the main prediction that subjects with a pro-white attitude would be biased in favor of whites whereas subjects with a pro-Negro attitude would be biased in favor of Negroes. Table 6 summarizes the analysis of variance of the data.

Table 6
Analysis of Variance for Pro-White Bias

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Ss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude (A)</td>
<td>2</td>
<td>426.736</td>
<td>2.847*</td>
</tr>
<tr>
<td>Error 1</td>
<td>122</td>
<td>149.906</td>
<td></td>
</tr>
<tr>
<td>Within Ss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem Distribution (P)</td>
<td>2</td>
<td>5,056.472</td>
<td>25.411**</td>
</tr>
<tr>
<td>P x A</td>
<td>4</td>
<td>395.034</td>
<td>1.985</td>
</tr>
<tr>
<td>Error 2</td>
<td>244</td>
<td>198.987</td>
<td></td>
</tr>
<tr>
<td>Trait Content (C)</td>
<td>2</td>
<td>1,232.819</td>
<td>11.341**</td>
</tr>
<tr>
<td>C x A</td>
<td>4</td>
<td>177.052</td>
<td>1.629</td>
</tr>
<tr>
<td>Error 3</td>
<td>244</td>
<td>108.708</td>
<td></td>
</tr>
<tr>
<td>P x C</td>
<td>4</td>
<td>1,844.325</td>
<td>20.590**</td>
</tr>
<tr>
<td>P x C x A</td>
<td>8</td>
<td>142.289</td>
<td>1.589</td>
</tr>
<tr>
<td>Error 4</td>
<td>488</td>
<td>89.573</td>
<td></td>
</tr>
</tbody>
</table>

* p ≤ .10
** p ≤ .001
Main effects due to attitude (A) were significant at the .10 level. Though the level of significance is not high, inspection of the means (Table 7) indicated that differences between pro-white attitude and pro-Negro attitude are in the predicted direction, and offer limited support for the hypothesis.

Table 7

Means for Main Effects of Attitude (A), Problem Distribution (P), and Trait Content (C)

<table>
<thead>
<tr>
<th>Attitude (A)</th>
<th>Pro-White Bias</th>
<th>Positive-Trait Bias</th>
<th>White Over Population Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro-White</td>
<td>2.570</td>
<td>1.349</td>
<td>2.793</td>
</tr>
<tr>
<td>Middle</td>
<td>0.561</td>
<td>2.741</td>
<td>1.523</td>
</tr>
<tr>
<td>Pro-Negro</td>
<td>0.743</td>
<td>3.895</td>
<td>1.451</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem Distribution (P)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Racial Equality</td>
<td>1.0227</td>
<td>1.8653</td>
<td>0.0493</td>
</tr>
<tr>
<td>White Superior</td>
<td>-2.6173</td>
<td>3.3640</td>
<td>2.0187</td>
</tr>
<tr>
<td>Negro Superior</td>
<td>4.7267</td>
<td>2.9067</td>
<td>-0.3067</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trait Content (C)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart-Dumb</td>
<td>2.6467</td>
<td>2.2693</td>
<td>-0.4160</td>
</tr>
<tr>
<td>Clean-Dirty</td>
<td>1.4093</td>
<td>2.2867</td>
<td>1.3640</td>
</tr>
<tr>
<td>Hardworking-Lazy</td>
<td>-0.9240</td>
<td>3.580</td>
<td>0.8133</td>
</tr>
</tbody>
</table>

Main effects of both problem distribution (P) and trait content (C) were statistically significant. Because of its applicability to groups of unequal sizes and its relative insen-
sitivity to departures from normality, Scheffe's method for paired comparisons (outlined in Hays, 1963) was used to test differences between specific means. Scores tended to be higher for Negro superior problems than for white superior problems \((p < .05)\) with neither condition differing from the racial equality problem. However, since the difference between the Negro superior and the white superior conditions can be at least partially attributed to an effort by the subjects to equalize the percentages, a \(t\)-test for correlated means was done to test whether the tendency to overestimate on the Negro superior problems was greater than the tendency to underestimate on the white superior problems. Results were significant at the \(p < .025\) level (df. 124, \(t = 1.98\) for a one-tailed test).

Subjects as a whole also tended to have higher pro-white bias scores when the traits smart-dumb were attributed to the population than when the traits hardworking-lazy were used \((p < .05)\). Neither of these bipolar trait conditions differed from the clean-dirty condition.

The significant \(P \times C\) interaction in Table 6 was primarily due to differences on the clean-dirty and smart-dumb conditions. The interaction effects are graphed in Figure 1. For the Negro superior condition the order of means was the same as the main effect means with pro-white bias for the smart-dumb
condition significantly higher than for any other problem \((p < .05)\). In the racial equality condition, however, pro-white bias tended to be higher for the clean-dirty condition than for either of the other two which were equal \((p < .05)\). The effect of the clean-dirty condition for the white superior problem was just the opposite.

![Figure 1. Mean scores on pro-white bias for racial equality, white superior, and Negro superior problem conditions in relation to trait content.](image-url)
Analysis of Variance for Positive-Trait Bias Contrast

Mean scores for positive-trait bias in relation to relative attitudes toward Negroes and whites are presented in Table 5. Scores, as noted above, were computed according to the following linear combination: positive-trait bias = \(0.5\) (white positive estimate error + Negro positive estimate error) - \(0.5\) (white negative estimate error + Negro negative estimate error). Thus a positive score reflects an overestimation of persons with positive traits regardless of race and a negative score reflects an overestimation of persons with negative traits. Table 8 presents an analysis of variance of the data.

Table 8
Analysis of Variance for Positive-Trait Bias

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Ss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude (A)</td>
<td>2</td>
<td>379.370</td>
<td>3.182*</td>
</tr>
<tr>
<td>Error 1</td>
<td>122</td>
<td>119.222</td>
<td></td>
</tr>
<tr>
<td>Within Ss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem Distribution (P)</td>
<td>2</td>
<td>221.221</td>
<td>2.775</td>
</tr>
<tr>
<td>P x A</td>
<td>4</td>
<td>11.855</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Error 2</td>
<td>244</td>
<td>79.714</td>
<td></td>
</tr>
<tr>
<td>Trait Content (C)</td>
<td>2</td>
<td>211.929</td>
<td>2.926</td>
</tr>
<tr>
<td>A x C</td>
<td>4</td>
<td>41.353</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Error 3</td>
<td>244</td>
<td>72.412</td>
<td></td>
</tr>
<tr>
<td>P x C</td>
<td>4</td>
<td>456.256</td>
<td>6.265**</td>
</tr>
<tr>
<td>A x P x C</td>
<td>8</td>
<td>74.368</td>
<td>1.021</td>
</tr>
<tr>
<td>Error 4</td>
<td>488</td>
<td>72.827</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
** p < .01
Main effects due to attitude (A) were significant at the .05 level. However, differences between specific pairs of means were not significant. This lack of significant differences is most probably a result of the large difference between the $n$ for the middle attitude level and both of the other levels.

Inspection of the direction of means (Table 7) reveals that mean overestimates of positive traits tends to be higher for the pro-Negro attitude condition than for the pro-white condition with the middle attitude group falling in between.

The significant P x C interaction in Table 8 was primarily due to differences between trait-content conditions within the white superior problem condition. The interaction effects are graphed in Figure 2. Although there were no differences among means within both the racial equality and the Negro superior problems, order of means for the three trait-content conditions within the white superior problem condition were as follows: hardworking-lazy, clean-dirty, smart-dumb. Differences between the white superior, hardworking-lazy condition and the remaining means (excluding the Negro superior, smart-dumb condition) were significant at the .05 level.
Figure 2. Mean scores on positive-trait bias for racial equality, white superior, and Negro superior problem conditions in relation to trait content.

Analysis of Variance for White-Overpopulation Bias Contrast

Mean scores for white-overpopulation bias are presented in Table 5. Scores were computed according to the following linear combination: 

\[ \text{white-overpopulation bias} = 0.5(\text{white positive estimate error} + \text{white negative estimate error}) - 0.5(\text{Negro positive estimate error} + \text{Negro negative estimate error}) \]

Thus, a positive score indicates an overestimation of the number of whites in the population and a negative score indicates an overestimation of the number of Negroes. Table 9 presents an analysis of variance of the data.
Table 9
Analysis of Variance for White-Overpopulation Bias

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Ss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude (A)</td>
<td>2</td>
<td>66.692</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Error 1</td>
<td>122</td>
<td>42.172</td>
<td></td>
</tr>
<tr>
<td>Within Ss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem Distribution (P)</td>
<td>2</td>
<td>588.262</td>
<td>14.741**</td>
</tr>
<tr>
<td>A x P</td>
<td>4</td>
<td>40.265</td>
<td>1.009</td>
</tr>
<tr>
<td>Error 2</td>
<td>244</td>
<td>39.907</td>
<td></td>
</tr>
<tr>
<td>Trait Content (C)</td>
<td>2</td>
<td>311.431</td>
<td>8.327**</td>
</tr>
<tr>
<td>A x C</td>
<td>4</td>
<td>8.963</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Error 3</td>
<td>244</td>
<td>37.402</td>
<td></td>
</tr>
<tr>
<td>P x C</td>
<td>4</td>
<td>88.164</td>
<td>2.455*</td>
</tr>
<tr>
<td>A x P x C</td>
<td>8</td>
<td>26.681</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Error 4</td>
<td>488</td>
<td>35.914</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
** p < .01

Both main effects of problem distribution (P) and of trait content (C) were significant at the .01 level. Tests between means summing over trait content indicates that over all subjects, overestimation of the number of whites was greater for the white superior condition than for either racial equality (p < .05) or Negro superior (p < .01) conditions. The latter two were not statistically different. Summing over problem distribution, the clean-dirty condition was higher than the...
smart-dumb condition \( (p < .10) \) and neither was different from the hardworking-lazy condition.

The significant \( P \times C \) interaction (Table 9) was due primarily to the higher estimation for the white superior, hardworking-lazy condition as compared to the seven lowest means \( (p < .01) \) and the white superior, clean-dirty condition \( (p < .05) \). See Figure 3.

![Figure 3. Mean scores on White-Overpopulation Bias for Racial Equality, White Superior, and Negro Superior Problem Conditions in Relation to Trait Content.](image-url)
CHAPTER IV: DISCUSSION

Effects of Attitude

The major hypothesis that subjects with a pro-white attitude would tend to overestimate the white positive and Negro negative categories and underestimate the white negative and Negro positive categories (as evidenced by a high pro-white bias score) while subjects with a pro-Negro attitude would do just the opposite received only limited support. The effects of attitude on the pro-white bias contrast did not reach significance although the means were in the predicted direction. Although the number of possible reasons for not confirming a hypothesis are usually limited only by the ingenuity of the experimenter, a few of the more likely reasons are as follows:

1. One can assume that if subjects were asked to make the experimental estimates about the population in general (i.e., without evidence about specific populations) their estimates would be a function of their beliefs about or attitudes toward the respective races. In order to correctly estimate the categories within the experimental populations then a subject would have to modify his opinion on counter-attitudinal problems by accepting new evidence. Since a component of prejudice when defined as a deviation from the norm
of rationality is the failure to modify opinions in the face of new evidence, the counter-attitudinal problems can be viewed as a measure of prejudice in the sense of a failure of rationality.

The independent measures of attitude however were based on the semantic differential which is a measure of the evaluative component of an attitude. In a sense then, prejudice is being defined as a relative dislike for one racial group over another. Harding et al. (1969, p. 5) call this a definition of prejudice in terms of a deviation from the norm of human-heartedness. Although almost all measures of prejudice have been found to correlate highly with each other, Schuman and Harding (1964) found that the only measures of prejudice in the sense of failure of rationality that correlated highly with other measures of prejudice and other types of ethnic attitude are measures of irrational bias against members of a particular group. Irrational bias in favor of a group can be assessed only by measures specifically designed for this purpose. Since the pro-white bias contrast is a function of both bias in favor of and bias against the respective races, it is possible that the lack of a relationship is a function of an inadequate attitude measure.

2. In line with the correlation between evaluative measures and measures of irrational bias against members of a
particular group, it is probable that attitude influenced the estimation of the unfavorable trait category. If all subjects tended to overestimate the white-positive category (as seems probable when measures on both pro-white bias and positive-trait bias are examined jointly), then the attitude effect on estimates of the Negro negative category might be masked or inhibited.

3. Both Schuman and Harding's and the present results however lead to another option. It is altogether possible that with realistic stimuli, attitude does not have the strong effect on perception and immediate recall that has been attributed to it in the past. Most studies showing such an effect on immediate recall were done before 1960 and used pro- and anti-attitudinal statements. Studies conducted after 1960 (Waly and Cook, 1966; Greenwald and Sakumura, 1967) have not found an effect of attitude. The effect of differential prior knowledge of the ideas contained in the statements does not seem to have been controlled in any of these studies. If one can assume that, due to the mass media's extensive coverage of the civil rights movement in the U. S. since 1960, college subjects are more likely now than before 1960 to be fairly well acquainted with the arguments of the "other side," these findings are consistent. The effects of
value on perception of stimuli (and in some cases on counting
the number of occurrences of a valued event) seems to be most
apparent only when the stimuli are unrealistic. As noted
above, Christ and Teichner (1967) did not find an effect with
realistic stimuli.

The inference that there is no effect whatsoever of
realistic stimuli value however does not seem to be warranted.
If this were true, then the effects of problem distribution
and trait content discussed in the next section would not
have been found.

4. Subjects who estimated percentages in a biased manner
may have been aware of this and attempted to counteract it by
marking the attitude scales in the opposite direction. If
those subjects whose percentage estimations were extreme did
this then they would be moving toward the middle attitude group,
leaving as members of the extreme groups subjects who did not
bias their percentage estimates.

The significant effect of attitude on positive-trait bias
indicates a tendency for estimates of positive traits regardless
of race to increase as preference for Negroes increases. This
finding is not unusual in light of other findings that pre-
judice is positively correlated with displacement of hostility
under frustration (Berkowitz, 1961, 1962; Weatherly, 1961),
alienation and "anomie" (McDill, 1961; Roberts and Rokeach,
1956) and authoritarianism (Adorno, Frenkel-Brunswik, Levinson, and Sanford, 1950). There was no effect of attitude on white-overpopulation bias. Since the only way to get it would be to make relatively high estimates for both the white positive and white negative categories, such an effect would not be expected.

5. It may be that simple dichotomous judgments (smart-dumb, etc.) strikes the subjects as stereotypes and simplistic. Karlins, Coffman, and Walters (1969) found that many subjects in a college population are reluctant to make generalizations about other groups. If a majority of the subjects were reluctant to differentiate the races on the traits, differences between the attitude groups would be minor. Bettleheim and Janowitz's (1964) findings of no significant relationship between personal stereotypes and personal attitudes suggests that even if the subjects did not resist stereotyping there may simply be no clear-cut relationship between stereotyping tendencies and ethnic attitudes.

**Other Effects**

The effect of problem distribution on pro-white bias was significant and indicated a tendency for all subjects to score higher on Negro superior problems than on white superior
problems. Due to the relative distribution of the true percentages in these problems, a negative score for white superior problems can be explained in line with other findings on estimation of relative quantities as simply an attempt to equalize the categories (i.e., underestimation of both high categories and overestimation of both low categories). A positive score for the Negro superior problem distribution may be due to the same tendency to equalize categories. The tendency to equalize percentages was greater for the Negro superior distribution than for the white superior distribution and therefore at least some bias across all subjects is indicated. This is further supported by findings on the white-overpopulation bias contrast variable. The mean score for the white superior problems was higher than for both the racial equality and the Negro superior problems suggesting that subjects were more reluctant to underestimate the white positive category than the Negro negative category.

An effect of trait content on pro-white bias scores was significant at the .001 level. The mean score was higher for the bipolar traits smart-dumb than for hardworking-lazy and neither differed from clean-dirty. When problem distribution is taken into account the results are somewhat different. Al-
though the means on the Negro superior problems were in accord with the direction of the trait main effects, on the racial equality problems clean-dirty was higher than either of the other two trait areas. An opposite effect was found on the white superior problems (i.e., clean-dirty was lower than either of the other trait areas).

The simplest explanation of these results is in terms of the order of problems in the problem box (which was constant for all subjects). Note that the Negro superior, smart-dumb problem was both the first problem worked by the subject and the problem on which subjects scored highest on pro-white bias. The second problem in the box turns out to be the problem on which subjects scored the lowest (white superior, clean-dirty). It seems as if the subject reacted to the implausibility of the first problem by making a strong attempt to equalize it. This may have been partially due to not knowing that in future problems the whites would have the upper hand occasionally. Then when confronted by the second problem where whites were superior, he tried to make up for his previous bias by biasing the estimates in the other direction. If this explanation is correct, then it is plausible to assume that without the order effect the Negro superior, smart-dumb mean would be lower and the white superior, clean-dirty mean would
be higher. If these adjustments are made, pro-white bias scores would then tend to be higher on the clean-dirty problems than on either of the other two. Some support for this interpretation is found in the high white-overpopulation bias scores for the white superior, clean-dirty problem which suggests that subjects may have been reluctant to underestimate the high white-clean category. Of the three trait areas, only the clean-dirty dimension is highly loaded on the evaluative factor of the semantic differential and thus the hypothesis that there is at least some pro-white bias across all subjects receives further indirect support.

That pro-white bias is less for the hardworking-lazy problems (as suggested by the main effects of trait content on pro-white bias) receives further support from the significant P x C interactions on positive-trait bias and white-overpopulation bias. The high scores on the white superior, hardworking-lazy problem for both measures can be interpreted as meaning that when confronted with inescapable evidence of the superiority of whites, the subject react by raising both the Negro hardworking category and the white lazy category thus equalizing the two races somewhat on the trait.
Structural Analysis

In looking at the four percentage estimates, it is helpful to think of them in terms of the problem confronting the subject. Because the four estimates had to sum to 100%, if the subject makes an error on one estimate, he is immediately faced with the problem of correcting it by making one or more errors in the opposite direction. The dilemma is confounded if what he thinks he sees is not what he thinks should be there. For example, if in the Negro superior problem a subject lowers the Negro positive and white negative percentages to come more in line with his pre-experimental opinion, it may be difficult for him to raise either the white positive or the Negro negative estimates if he remembers that they were both quite low.

The covariance matrix in Table 3 gives some information on how subjects went about solving this problem. The structural analysis confirmed the correctness of the equipredictability covariance pattern. The following relations among the elements in the covariance matrix can therefore be assumed: 1) covariance between white positive and white negative = covariance between Negro positive and Negro negative = variance due to the trait component, 2) covariance between white positive and Negro positive = covariance between white negative and Negro negative = variance due to the race component, 3) covariance between white positive and Negro negative = covariance between white
negative and Negro positive = variance due to the general ability level component which in this case is equal to zero (since all estimates had to sum to 100%). Inspection of $\sum_\text{x}$ indicates that variance due to the trait component is relatively large compared to variance due to the race component. The pattern of the covariances suggests that if a subject makes an error on a category estimate, he will most probably correct it by making an opposite error on the same race - different trait category. There is a somewhat lesser tendency to correct the error by making an opposite error on the different race - same trait category.

The tendency to correct an estimate error within the same race is logical in the sense that if a subject thinks a race is high on a trait, he would probably think it was low on the opposite trait. The tendency to correct an estimate error within the same trait designation indicates that if a subject sees one race as high on a trait, he tends to see the other race as lower on it and vice versa. This latter tendency can be explained as a tendency to exaggerate differences between the races. It is important to note here that the estimates can be described in terms of the effects of the race factor (Negro and white) and the trait factor (positive and negative) because of the conformity of the obtained covariance matrix to the
model specified by the equipredictability covariance pattern. It is not a necessary condition of the design.

It is interesting to note that if all estimates were either extremely pro-white biased or extremely pro-Negro biased, one would expect high covariances in the following directions:

<table>
<thead>
<tr>
<th></th>
<th>White Positive</th>
<th>White Negative</th>
<th>Negro Positive</th>
<th>Negro Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Positive</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>White Negative</td>
<td>1</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Negro Positive</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Negro Negative</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Such an overall covariance matrix would not be expected in part because of the large number of middle attitude subjects. Although the covariance matrices are helpful in determining relationships they are of no use in determining the direction of specific errors actually made. The transformation of the scores into the three contrast variables, therefore, had the asset of not only preserving the relationships between the category errors but of also indicating the direction of error.

Attitude Distribution

A significant number of whites rated Negroes more favorably than they did whites. This is interesting in view of the fact
that almost without exception others have found (for whites at least) own race preference greater than other race preference (Morland, 1962; Landreth and Johnson, 1953; Stevenson and Stewart, 1958; Gilbert, 1951; Horowitz, 1936; Katz and Braly, 1933). Findings that people tend to recall more favorable items about their own group than about other groups lends support to this belief (Alper and Korchin, 1952; Taft, 1954; Kanungo and Das, 1960). Bettleheim and Janowitz (1964) in reviewing the literature, however, noted a decline over the previous two decades in derogatory stereotyping of Negroes. Karlins, et al. (1969) confirmed this tendency and also noted an increasing tendency for American whites to categorize themselves in decidedly less flattering terms. However, neither of the latter two studies found white evaluation falling below Negro evaluation. It should be noted here of course that in this study the majority of subjects did express a higher preference for own race over other. A finding that approximately 20% of the subjects in a predominately white, middle class, Catholic University evaluate Negroes higher than members of their own white race, however, does suggest that in future research own race preference should not be assumed to hold across the board. Adding in the subjects who evaluated
both races equally (11) we find that close to one third of the subjects did not evaluate their own group as superior. Hopefully this trend in attitude change is real. If so, it is probably a result of the increasing attention given to the black man, the many stories, in depth studies, etc. in the mass media. The "Black is beautiful" movement and perhaps increasing guilt among many whites for the white racism in America are likely other factors. The fact that the semantic differential followed immediately after the percentage estimation problems suggests the possibility that, some subjects may have seen through the cover story at this point and lowered their scores in order to appear more acceptable to the experimenter. A related possibility is that the nature of the last three problems (Negro superior, White superior, racial equality) had an effect on attitude in the direction of a more pro-Negro attitude. To eliminate these last two effects, the best design would be to separate the attitude measures and problems. Since racial attitudes are apparently rather stable over time, there is no reason why in the future the attitude measures could not be given weeks or months before or after the actual experiment.
Summary

In summary it can be said that there does not seem to be a significant relationship between a subject's relative racial attitude as measured by the semantic differential and percentage estimation of positive and negative traits with a Negro and white population. The direction of means over the three attitude levels, however, was in the predicted direction and suggests that the lack of relationship may have been due to an inadequate measure of attitude. It is possible that a measure based on a "failure in rationality" would be more appropriate. Further research is needed to test this hypothesis.

Results indicate a tendency across all subjects to bias the estimates in favor of whites. This tendency seems to be most pronounced in the Negro superior problems and in problems where the trait content is clean-dirty. There is also some support for inferring that whites are reluctant to view Negroes as lazy. These findings suggest that a subject would be more prone to infer a correlation between race and trait when the relationship is favorable to whites. The tendency to equalize distributions, however, seems to indicate that subjects would be reluctant to infer any strong correlation between race and trait. A significant effect of attitude on estimation of positive-trait persons irrespective of race suggests that pro-
Negro subjects would be less likely to infer a difference between the two races than pro-white subjects.
Appendix A

Order of Problems

<table>
<thead>
<tr>
<th>Problem Number</th>
<th>Problem Distribution (P)</th>
<th>Trait Content (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Negro Superior</td>
<td>Smart - Dumb</td>
</tr>
<tr>
<td>2.</td>
<td>White Superior</td>
<td>Clean - Dirty</td>
</tr>
<tr>
<td>3.</td>
<td>White Superior</td>
<td>Hardworking - Lazy</td>
</tr>
<tr>
<td>4.</td>
<td>Racial Equality</td>
<td>Clean - Dirty</td>
</tr>
<tr>
<td>5.</td>
<td>Racial Equality</td>
<td>Smart - Dumb</td>
</tr>
<tr>
<td>6.</td>
<td>White Superior</td>
<td>Smart - Dumb</td>
</tr>
<tr>
<td>7.</td>
<td>Negro Superior</td>
<td>Hardworking - Lazy</td>
</tr>
<tr>
<td>8.</td>
<td>Negro Superior</td>
<td>Clean - Dirty</td>
</tr>
<tr>
<td>9.</td>
<td>Racial Equality</td>
<td>Hardworking - Lazy</td>
</tr>
</tbody>
</table>

Note: All subjects get the same order of problems.
Appendix B

Exact Wording on Instruction Cards
(including cover stories)

and

Percentage Estimation Cards

1. General Instruction Card

Most people could work a percentage problem on paper. But in daily life the impression a person has of a particular group usually determines his estimation of the percentage of people in that group having a particular trait. This is a test to see how well people estimate percentages on the basis of first impressions. How well you do has nothing to do with your intelligence or mathematical ability. Because most recent group research has considered race differences and similarities, the problems have been drawn from this area.

There are nine problems and for each problem there is one deck of cards. To work the first problem, pick up the first deck of cards, marked "Problem 1." Read and follow the instructions on the first card in the deck. After working the problem return the deck to its proper place in the box and pick up the card deck for the next problem. Instructions for each
problem will be on the first card of each deck. After you have worked all nine problems, pick up the next deck of cards. Further instructions will be on the first card of that deck.

RETURN THIS CARD TO THE BOX - PICK UP PROBLEM 1 DECK

2. Instruction Card for Problem 1

The International Institute of Scientific Research did a study to determine whether or not there are any real differences between American Negroes and White people. They took a large sample of Negro people and a large sample of White people. They then measured each person in the Negro group and each person in the White group for intelligence. If the person's IQ was above a certain level they called that person Smart and if the person's IQ was below a certain level they called that person Dumb. This set of cards represents a cross section of the people used in the study. There is one card for each person. Each card tells the person's race, White or Negro, and his intelligence, Smart or Dumb. Look at each card in this set once and then put it on the bottom of the deck. When you have looked at all the cards you are to answer the questions on the last card. After answering the questions put the deck back in the box and pick up the deck of cards for Problem 2.
Remember that this is a test of first impressions; do not try to count the cards. Go through the cards at a steady pace and try to form a general impression.

3. Percentage Estimation Card for Problem 1

Answer the following four questions on the basis of your first impressions. Do not spend a lot of time thinking about the answer; just put down your first impression. Remember that the four percentages should add up to 100%.

What percentage of Negroes are Dumb? 

What percentage of Whites are Dumb?

What percentage of Negroes are Smart?

What percentage of Whites are Smart?

Total 100%

RETURN DECK TO BOX UNDER PROBLEM 1 PICK UP DECK FOR PROBLEM 2

4. Instruction Card for Problem 2

Recently there has been quite a controversy concerning whether White people or Negro people keep their houses up better. The Metropolitan Commission on Urban Affairs undertook a study of the problem. A team of both Negro and White real estate agents rated a large number of Negro homes and a large number of White homes. If a home received above a certain score it
was called Clean and if a home received below a certain score it was called Dirty. This set of cards represents a cross-section of the homes rated in this study. There is one card for each home. Each card tells the homeowner's race, White or Negro, and his home up-keep rating, Clean or Dirty. Look at each card in this set once and then put it on the bottom of the deck. When you have looked at all the cards you are to answer the questions on the last card. After answering the questions put the deck back in the box and pick up the deck of cards for Problem 3.

Remember that this is a test of first impressions; do not try to count the cards. Go through the cards at a steady pace and try to form a general impression.

5. Percentage Estimation Card for Problem 2

Answer the following four questions on the basis of your first impression. Do not spend a lot of time thinking about the answer; just put down your first impression. Remember that the four percentages should add up to 100%.

What percentage of Negro homes are Clean? 
What percentage of White homes are Clean? 
What percentage of Negro homes are Dirty? 
What percentage of White homes are Dirty? 

Total  

100%
6. Instruction Card for Problem 3

After passage of the Equal Opportunity Act, the National Association of Consultants to Employers conducted a survey on the work habits of American White men and American Negro men. A large group of workers were studied and each worker was rated on both efficiency at work and number of hours worked per week. If the two ratings added together were above a certain score the worker was called Hardworking and if the two scores added together were below a certain score the worker was called Lazy. There is one card for each man. Each card tells the worker's race, White or Negro, and his work rating, Hardworking or Lazy. Look at each card in this set once and then put it on the bottom of the deck. When you have looked at all the cards you are to answer the questions on the last card. After answering the questions put the deck back in the box and pick up the deck of cards for Problem 4.

Remember that this is a test of first impressions; do not try to count the cards. Go through the cards at a steady pace and try to form a general impression.

7. Percentage Estimation Card for Problem 3

Answer the following four questions on the basis of your
first impression. Do not spend a lot of time thinking about the answer; just put down your first impression. Remember that the four percentages should add up to 100%.

What percentage of Whites are Lazy? 
What percentage of Negroes are Lazy? 
What percentage of Whites are Hardworking? 
What percentage of Negroes are Hardworking? 

Total 100%

RETURN DECK TO BOX UNDER PROBLEM 3 PICK UP DECK FOR PROBLEM 4

8. Instruction Card for Problem 4

The cards in this deck represent a different cross-sectional group of homeowners rated by the Metropolitan Commission on Urban Affairs. There is one card for each home. Each card tells the homeowner’s race, White or Negro, and his home up-keep rating, Clean or Dirty. Look at each card in this set once and then put it on the bottom of the deck. When you have looked at all the cards you are to answer the questions on the last card. After answering the questions put the deck back in the box and pick up the deck of cards for Problem 5.

Remember that this is a test of first impressions; do not try to count the cards. Go through the cards at a steady pace and try to form a general impression.
9. Percentage Estimation Card for Problem 4
(Same as for Problem 2 with questions in different random order.)

10. Instruction Card for Problem 5
The cards in this deck represent a different cross-sectional group of persons tested for IQ by the International Institute of Scientific Research. There is one card for each person. Each card tells the person's race, White or Negro, and his intelligence, Smart or Dumb. Look at each card in this set once and then put it on the bottom of the deck. When you have looked at all the cards you are to answer the questions on the last card. After answering the questions, put the deck back in the box and pick up the deck of cards for Problem 6.

11. Percentage Estimation Card for Problem 5
(Same as for Problem 1 with questions in different random order.)

12. Instruction Card for Problem 6
(Same as Instruction Card for Problem 5).

13. Percentage Estimation Card for Problem 6
(Same as for Problem 1 with questions in different random order.)
14. Instruction Card for Problem 7

The cards in this deck represent a different cross-sectional group of workers rated by the National Association of Consultants to Employers. There is one card for each worker. Each card tells the worker's race, White or Negro, and his work rating, Hardworking or Lazy. Look at each card in this set once and then put it on the bottom of the deck. When you have looked at all the cards you are to answer the questions on the last card. After answering the questions, put the deck back in the box and pick up the deck of cards for Problem 8.

Remember that this is a test of first impressions; do not try to count the cards. Go through the cards at a steady pace and try to form a general impression.

15. Percentage Estimation Card for Problem 7
(Same as for Problem 3 with questions in different random order.)

16. Instruction Card for Problem 8
(Same as Instruction Card for Problem 4.)

17. Percentage Estimation Card for Problem 8
(Same as for Problem 2 with questions in different random order.)
18. Instruction Card for Problem 9
(Same as Instruction Card for Problem 7.)

19. Percentage Estimation Card for Problem 9
(Same as for Problem 3 with questions in different random order.)

20. Semantic Differential Instruction Card

The purpose of this test is to measure the first impression various people have of different groups. The following cards are designed to allow you to give your first impression by rating different groups on a series of descriptive scales. On each card you will find a different group listed at the top and beneath it a set of scales. Here is how to use the scales:
Place an "X" in the appropriate space on each of the seven-point scales. For example if you feel that the group is VERY GOOD, you might place your "X"
   bad: ______: ______: ______: ______: ______: ______: ______: X : good
   neutral
If you feel that the group is VERY BAD, you might place your "X"
   bad: X : ______: ______: ______: ______: ______: ______: ______: good
   neutral
Or you might feel that the group should be somewhere in between in which case you should mark your "X" in one of the middle
spaces. It is important that you CHECK ONLY IN THE SPACES, that you CHECK EVERY SCALE FOR EVERY GROUP and that you put only ONE CHECK ON A SINGLE SCALE. Work fairly quickly. Do not worry or puzzle over individual items. Do not look back through the cards. Check only your FIRST IMPRESSIONS.
References


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Landreth, Catherine, and Johnson, B. C. (1953). Young children's responses to a picture and inset test designed to reveal reactions to persons of different skin color. Child Development, 24, 63-79.


APPROVAL SHEET

This thesis submitted by Marsha M. Linehan has been read and approved by one member of the Department of Psychology.

The final copies have been examined by the director of the thesis, and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the thesis is now given final approval with reference to context, form, and mechanical accuracy.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

June 2, 1970

Date

Signature of Advisor