Journal of Personality and Social Psychology
1985, Vol. 48, No. 2, 297–311

0022-3514/85/$00.75

Perception of Social Distributions

Richard E. Nisbett and Ziva Kunda
University of Michigan

Accurate representation of the distribution of social attitudes and behaviors can guide effective social behavior and is often essential for correct inferences. We examined the accuracy of people's beliefs about the distributions of a large number of attitudinal and behavioral dimensions. In two studies we measured actual attitudes and behaviors in a student population, and we assessed beliefs by asking subjects to estimate the distribution of 100 students on these dimensions. We examined the accuracy of subjects' perceptions of the means, standard deviations, and distribution shapes. Subjects showed a number of systematic biases, including overestimation of dispersion and overestimation of the means of behavioral distributions and a false consensus bias, but their overall accuracy was impressive.

Approximate knowledge of the distributions of important social variables would seem to be essential for effective social functioning. Reasonably accurate guesses about the dispersion and central tendency of important behavioral and attitudinal dimensions could serve to guide one's behavior and self-presentation in unfamiliar social situations. Such knowledge could allow one to adhere to accepted norms of behavior and conversation and to steer away from controversial topics so as to avoid offending others who hold different opinions. Indeed, one's effectiveness in group situations often depends on the ability to gauge the extent of support for one's own position. Politicians have long appreciated the value of knowledge about others' opinions, and contemporary ones are willing to spend large sums of money on polls designed to obtain very precise knowledge of opinions.

Approximate knowledge of the parameters of social distributions also would seem to be essential in order to make appropriate inferences about the meaning of social behavior. In fact, Kelley (1967) considered "consensus information," that is, information about the distributions of people's attitudes and behavior, to be a major factor in his analysis of variance (ANOVA) scheme for inferences about causality in the social domain. More recently, Thagard and Nisbett (1982) have argued that knowledge about the variability of kinds of objects, including social objects, is required for appropriate generalizations. Nisbett, Krantz, Jepson, and Kunda (1983) have demonstrated that such knowledge mediates other types of statistical inference as well.

Despite the importance of people's perceptions of social distributions, there are very few studies that have examined the degree of people's accuracy in perceiving the central tendency, dispersion, or shape of behavioral and attitudinal distributions.

Some indirect evidence comes from work on perception of physical objects, which indicates that people are highly sensitive to all three of these parameters. It has long been known that people are quite able to estimate the central tendencies of perceptual distributions (e.g., Peterson & Beach, 1967; Posner & Keele, 1968). More recent work by Fried and Holyoak (1984; Flannagan, Fried, & Holyoak, 1984) shows that people are also sensitive to dispersion and distribution shape. They presented subjects with computer-generated variations on a particular visual theme, for example, a pattern of light and dark patches on a grid or a pattern of colored rectangles.

This research was supported by National Science Foundation Grant SES–8218846 and National Institute of Mental Health Grant 1RO1 MH38466–01. We thank J. E. Keith Smith for advice on the analysis of the data and Henri Zukier for theoretical suggestions. Keith Holyoak, Daniel Kahneman, Jon Krosnick, Darrin Lehman, and Lee Ross provided thoughtful criticism of an earlier draft of this article. Sara Freeland provided able editorial help.

Requests for reprints should be sent to Richard E. Nisbett, Institute for Social Research, University of Michigan, Ann Arbor, Michigan 48106.

Subjects were more willing to classify a given variant as an exemplar of a particular type of pattern if the previous exemplars were highly variable on the dimensions composing the type, than if previous exemplars were less variable. Subjects were also highly sensitive to distribution type. When the dimensions from which exemplars were constructed were distributed in a normal bell-shaped curve, subjects readily learned to classify a pattern as being of the particular type that in fact generated it. The probability of assigning a pattern to its parent type was greatest near the center of the dimensions underlying the type and fell off in proportions dictated by the shape of the normal curve.

When subjects were instead presented with patterns generated by bimodal, U-shaped dimensions, their classifications did not track the actual frequencies of the dimension values. Instead, subjects made their guesses about classification as if they believed the distributions of the dimensions were normal. Even after a very large number of trials exposing them to different patterns, subjects failed to distribute their guesses in the same fashion as the actual dimensions. Instead, their guesses were distributed in an essentially flat fashion across the dimensions.

Work on the perception of physical dimensions thus indicates that people can be quite accurate in assessing central tendency and dispersion and that they have a very heavy bias toward perceiving normality in distribution shapes. Given the apparent frequency of normal distributions in nature, it is possible that this bias might serve to make perception more accurate and efficient. Observation of a very few exemplars would serve to give a fair idea of central tendency, and, if normality of the dimensions is presumed, variance or standard deviation could also be estimated with fair accuracy. Thus the classification of new objects or events would be maximally efficient in a statistical sense, so long as the underlying dimensions are in fact distributed approximately normally.

Although it is possible that people are also accurate about the central tendency and dispersion of social distributions and have a useful bias toward assuming their normality, there are good grounds for suspecting that they might not be very accurate. This is because beliefs about social dimensions are subject to some unique sources of bias. The following potential errors in the perception of social distributions have been identified (cf. Nisbett & Ross, 1980):

1. People seem likely to be influenced by the availability of exemplars (Tversky & Kahneman, 1973). Because extreme behaviors and opinions are likely to be salient (indeed people with extreme dispositions and opinions are likely to take steps to guarantee that they will be salient), their overrepresentation in memory may lead to an overestimation of the variability of social distributions. Indeed, it has been shown that individuals with extreme physical or social characteristics are more available in memory and are consequently estimated as more frequent than corresponding numbers of less extreme individuals (Rothbart, Fulero, Jensen, Howard, & Birrell, 1978).

2. A special case of availability, that is, knowledge about one's own value on social dimensions, might produce systematic errors in estimates of central tendency. One's perception of the entire distribution might be shifted toward one's own location. This false consensus tendency has already been documented for a number of attitudes (e.g. Fields & Schuman, 1976) and behaviors (Ross, Greene, & House, 1977).

These investigators and others whom they cite (as well as subsequent studies, e.g., Judd & Johnson, 1981 and van der Pligt, 1984), have shown that people tend to assume that a higher fraction of the population shares their own views, or would behave as they have, than is the case. The work gives us little indication, however, of the degree of distortion that this produces in estimates of central tendency and no indication at all of the effects on estimates of dispersion or distribution shape.

3. There is a well-known tendency of group members to exaggerate the differences between themselves and out-group members (e.g., Campbell, 1967; Child & Doob, 1943; Quattrone, in press; Sherif, Harvey, White, Hood, & Sherif, 1961; Tajfel, 1970; Vinacke, 1949). This suggests the possibility that people might have a bias toward assuming bimodality for social distributions—"my kind" and "not my kind" (a tendency actually found in one study by Judd & Johnson, 1981).

Current theory and some evidence therefore suggest that people may not be as accurate in their perceptions of statistical parameters for social distributions as in their perceptions for physical distributions. Additional support for this expectation is suggested by research on inferential errors. Substantial evidence shows that people do not make proper inferences when reasoning about problems involving social distributions. For example, Hamill, Wilson, and Nisbett (1980) showed that people may draw essentially the same conclusions about a population when told that an extreme-appearing case is a highly biased sample of the population as when they are told that the case is drawn from the center of the population distribution.

It is possible to explain errors such as these either in terms of people's inadequate command of the requisite statistical rules (Kahneman & Tversky, 1972, 1973; Tversky & Kahneman, 1974) or in terms of their inability to picture the relevant social distributions. Recent work shows that faulty beliefs may play a bigger role in producing inferential errors than originally thought.

It appears that people may have some appreciation of statistical rules but that these may be applied only to domains that lend themselves to accurate representation of the central tendencies and dispersions of the relevant distributions (Fong, Krantz, & Nisbett, 1984; Jepson, Krantz, & Nisbett, 1983; Kunda & Nisbett, 1984; Nisbett et al., 1983). For example, people seem to be able to reason statistically about abilities and about sports events but to have more difficulty reasoning statistically about personality traits and social behaviors.

This seems to be the case because it is easier to perceive the distributions of the former sorts of events than of the latter. The units of measurement for abilities and sports events are usually clear (score on the test, number of baskets shot), and they are often observed in situations that are relatively fixed, therefore permitting comparisons among people.

Traits and most other social behaviors are not so clearly measurable: There are no obvious units for shyness or honesty, for example; and it is rare to observe large numbers of people in situations that can be presumed identical, so that their behavior can be directly compared. These results suggest that beliefs about social distributions might be quite inaccurate, perhaps due to the kinds of biases discussed earlier.

Thus it is important to determine how accurate people's perceptions of social distributions are, both because of the "first order" importance of accuracy about social distributions for purposes of social conduct and because of the "second order" importance of accuracy for purposes of inferences about causality and meaning.

The results of an investigation of the accuracy of perception of social distributions also would have educational implications. It has been shown that instruction in statistics improves people's ability to answer statistical questions about everyday social objects and events (Fong et al., 1984; Krantz, Fong, & Nisbett, 1984). If it should turn out that people have very inaccurate beliefs about social distributions, however, then this would imply that training should also focus on teaching people how to represent social distributions accurately.

Study 1: Perception of Behavioral and Attitudinal Dimensions

Method

Selecting Dimensions

In Study 1, we examined the accuracy of subjects' perceptions of the mean, standard deviation, and shape of a number of behavioral and social distributions. To choose the dimensions, we tacitly defined a space of social attitudes and behaviors including public and private ones, socially desirable and socially undesirable ones, and seemingly important and trivial ones. From these we chose dimensions haphazardly within the constraint that we wanted to include a large number of nonnormal distributions in order to see whether subjects would be biased toward seeing them as normal.

Thus, we tried to include dimensions that would produce bimodal distributions and J distributions with the central tendency far to the right or left of the scale of logical possibilities for the dimension. The resulting set of items is very arbitrary and cannot be considered an unbiased sample from any precisely defined universe of behaviors and attitudes. It is unclear, of course, whether any procedure could approximate such a sample.

Subjects and Procedure

Subjects were 247 University of Michigan students enrolled in introductory psychology classes. Only 14% of the subjects had had any training in statistics. They participated in groups of 3 to 8. Sixty-two of the subjects were asked to indicate the frequency of their actual behavior on each of 17 dimensions, and 87 subjects were asked to indicate their attitudes on each of 21 dimensions. Forty-eight subjects were asked to estimate the distributions of 100 of their fellow University of Michigan students on each of the behavioral dimensions (i.e., their reports of their behavior), and 50 subjects were asked to estimate the distributions of the attitudinal dimensions.

Behavioral Items

Subjects were asked 17 questions about behavior. These were all answered on the scale below:

Never	Once a year	2–5 times a year	6–11 times a year	Once a month	2–3 times a month	Once a week	2–3 times a week	4–6 times a week	Daily

The questions asked were the following: (a) How often do you play tennis? (b) How often do you shoot pool? (c) How often do you smoke marijuana? (d) How often do you have any trouble getting to sleep? (e) How often are you bothered by nervousness? (f) How often are you troubled by headaches? (g) How often do you feel blue or down? (h) How often are you bothered by nightmares? (i) How often do you attend religious services? (j) How often do you go to concerts? (k) How often do you go to parties? (l) About how often do you get drunk during the year? (m) How often do you go to bars or nightclubs? (n) How often do you drink alcoholic beverages? (o) How often do you go to movies? (p) How often do you get angry with someone? and (q) How often are you late to class?

Attitudinal Items

Subjects were asked eight questions about attitudes on 10-point scales, and to make sure that our findings about accuracy would not be limited to the case of the 10-point scales, with their particular format, subjects were also asked to evaluate 13 objects on 5-point scales. The two scales are reproduced below:

Very strongly disapprove	Strongly disapprove	Disapprove	Somewhat disapprove	Slightly disapprove	Somewhat approve	Approve	Strongly approve	Very strongly approve

Dislike very much	Dislike somewhat	Neither like nor dislike	Dislike somewhat	Dislike very much

The questions asked on 10-point scales were the following: (a) How do you feel about people your own age taking hard drugs? (b) How do you feel about people your age living with another person while not being married? (c) How do you feel about women being allowed to have an abortion on demand? (d) How do you feel about Ronald Reagan's conduct of the Presidency to date? (e) How do you feel about U.S. intervention to support the government in El Salvador? (f) How do you feel about increasing defense spending? (g) How do you feel about the University's plan to eliminate some schools and departments in order to generate money for new programs? (h) How do you feel about Harold Shapiro's conduct of the University Presidency to date?

The objects that subjects were asked to evaluate on 5-point scales were the following: (a) the actress Jane Fonda, (b) the television anchor Dan Rather, (c) the movie *Raiders of the Lost Ark,* (d) the movie *Star Wars,* (e) Pepperidge Farm cookies, (f) McDonald's hamburgers, (g) Saudi Arabians, (h) the Moral Majority, (i) Campbell's chicken noodle soup, (j) Ritz crackers, (k) the model Brooke Shields, (l) former Secretary of State Alexander Haig, and (m) international oil companies.

Results

We examined subject accuracy about distribution parameters—central tendency and dispersion—in three complementary ways. (a) We calculated average correlation, across items, between a given subject's estimates and the actual values. This measure provides an indication of the extent to which people are calibrated about the ranking of the items on each of these parameters, that is, about their relative magnitudes. (e.g., a high correlation between subjects' estimates for the means of different behaviors and the actual values for the means, would indicate that subjects are knowledgeable about the relative frequency of behaviors of different kinds.)

(b) We calculated simple average absolute deviation of the estimates from the actual parameter. This measure provides an indication of how close the estimates of the average person are to the actual parameters, for the average dimension. (e.g., small average absolute discrepancies of estimates of behavior means from actual behavior means would indicate that subjects are highly accurate about the absolute frequency of various behaviors.)

(c) In order to provide a way of evaluating these absolute deviations and assessing their implications, we also looked at the number of cases, drawn randomly from actual distributions, that was required to equal the accuracy of the average subject's guesses about parameters as measured by absolute deviations. This measure indicates the size of the sample, drawn from the actual distribution, that would provide estimates of the parameters that were as accurate as those of the average subject. This measure was based on computer-drawn, randomly generated samples of different *n*s from the actual distribution of each item.

For each item we drew 10 samples of each *n*. We calculated the mean and standard deviation of each such sample and then calculated, as we did for subjects' estimates, the absolute deviations of these statistics from the parameters of the actual distributions from which each sample was drawn. These were averaged over items for each sample size, and the resulting average absolute deviations were compared to those of the subjects' estimates. Accuracy is estimated by the number of cases in the random samples required to equal subjects' discrepancies from actual values. The more cases required, the more accurate subjects are.

For each of these analyses, the basic datum was our computation of the estimated parameters, based on subjects' histograms. To avoid circumlocutions, however, we will refer to subjects' "estimates of parameters" rather than to our computation of the parameters based on subjects' estimates of distributions across scale points. (Similarly, we asked subjects about their reports of behavior rather than measuring their behavior, but to avoid circumlocutions we will refer to these as "actual behavior" rather than as "reported actual behavior.")

Although significance levels for analyses of type (b), absolute average deviation, are reported, these are descriptive merely, because the various estimates are not independent. The results of these analyses are summarized in Table 1.

Accuracy About Central Tendency

Behavioral dimensions. As may be seen in the top row of Table 1, subjects' perceptions of the means of behavioral dimensions were moderately accurate on the whole. The average correlation between a given subject's estimates of the means of the 17 behavioral dimensions and the actual means of the dimensions was .42 ± .06.[1] The average absolute error of estimates of the means of behavioral distributions was only 1.19 on the 10-point scale. Because actual means ranged from 2.66 to 5.95, the accuracy was not due to limits on the range of possible error. There was, however, a systematic bias in the subjects' estimates of behavioral distributions toward overestimating behavior of all kinds. For 13 of the 17 distributions, the average estimate of the mean was significantly higher than the actual mean for the dimension.[2]

Partly because of the overall bias toward overestimation of the frequency of behaviors, subjects' guesses about means were not terribly accurate when compared with the results of computer-drawn random samples of the actual distributions. On the average, a sample of only 2 cases from behavioral distributions came as close to the actual means as did the guesses by a typical subject.

Attitudinal dimensions. Subjects were more accurate about the means of attitudinal dimensions. The average correlation between a given subject's estimate of the means of the attitudinal distributions (pooling the results for 10-point scales and 5-point scales) and the actual means of the distributions was .73 ± .05. The average subject's guess about the mean of 10-point scale items was only .89 away from the actual mean. (Actual means

---

[1] All intervals represent 95% confidence intervals for the correlations.

[2] All *p* values reported are based on two-tailed tests.

Table 1
Summary of the Results of Study 1

	Average correlation of each subject's estimates with the actual parameters	Overestimation of parameters	Average absolute deviation of estimates from parameters	Size of randomly drawn sample with same absolute deviation
Central tendency				
Behaviors	.42 ± .06	yes	1.19	2
Attitudes	.73 ± .05	no	.89	3.57
(5-point)			.48	
Dispersion				
Behaviors	.47 ± .05	13%	.45	6
Attitudes	.26 ± .08	9%	.63	10.57
(5-point)			.18	

ranged from 2.91 to 6.14.) The average subject's guess about the mean of the 5-point scale items was only .48 away from the actual mean. (Actual means ranged from 2.26 to 4.12). There was no systematic distortion of the location of the mean toward either end of the scale. Subjects as a group were significantly wrong in their estimates of only 12 of the 21 means; 5 of these were overestimates and 7 were underestimates. On average, it required a random sample of 3.57 cases from an attitudinal distribution to equal the accuracy of the typical subject's guess about the mean.

Accuracy About Dispersion

Behavioral dimensions. Subjects' estimates about dispersion were also fairly accurate, despite a bias toward overestimating variability. The average correlation between the standard deviation calculated for a given subject's estimates of the behavioral distributions and their actual standard deviations was .47 ± .05. On average, subjects overestimated the standard deviation of behavioral distributions by 13%.

The results of *t* tests contrasting standard deviations of estimated distributions with standard deviations of actual distributions yielded nine significant overestimates and only four significant underestimates. The absolute discrepancy of standard deviation estimates from actual standard deviations was .45 for the average subject, across dimensions. (The range of actual standard deviations was from 1.15 to 2.40.) It required a random sample of 6 cases to equal this level of accuracy.

Attitudinal dimensions. The average correlation between a given subject's estimates of the standard deviations of the attitudinal distributions and their actual standard deviations was .26 ± .08. Subjects overestimated the standard deviations of attitudinal dimensions by 9% on the average. Results of *t* tests contrasting standard deviations of estimated distributions with standard deviations of actual distributions yielded nine significant overestimates and only two significant underestimates.

The absolute discrepancy of standard deviation estimates from actual standard deviations was .63 for the average subject for 10-point scales (where the actual range was 1.81 to 3.19) and .18 for 5-point scales (actual range .68 to 1.26). It required a random sample of 10.57 cases to equal this level of accuracy.

It is striking that it required a substantially larger random sample of the actual distribution to equal subjects' average accuracy about standard deviations than to equal subjects' average accuracy about means. Because the statistician's calculation of standard deviation is substantially more complicated than the calculation of a mean, this is surprising on its face. On the other hand, it is distinctly possible that subjects' rough-and-ready estimates of dispersion are actually easier for them to compute and less prone to error than their rough-and-ready estimates of means.

Table 2
Percentage of Subjects Who Estimated a Given Distribution Shape for Each Type of Actual Distribution Shape

Actual distribution shape	Estimated distribution shape			
	J Left	Normal	J Right	Bimodal
J Left	30	44	2	24
Normal	12	64	4	20
J Right	1	38	43	18
Bimodal	9	51	6	34

A statistician can obtain a quite good estimate of the standard deviation of a sample of 20 cases simply by dividing the range by 4 or 5 (cf. Snedecor, 1946, p. 198). No comparably easy estimate of the mean of 20 cases exists. In addition, any rough calculation of the standard deviation relying on the range requires memory only for two values—the highest and the lowest observed—and these values would tend to be quite memorable. Comparable accuracy for the mean would require either remembering many more cases than that or forgetting just the right ones!

A seeming anomaly in the attitude data should be mentioned. Although the accuracy of mean estimates was considerably higher than the accuracy of standard deviation estimates as measured by correlations, the reverse was true as measured by the size of the randomly drawn sample with an equally large absolute deviation. We suspect that this was true in part because subjects' estimates of the standard deviations for attitudes in general were very close to the true range of standard deviations, whereas the actual differences among standard deviations for attitudes were very small.

This latter fact resulted in extreme truncation of range for standard deviations of attitudes. Thus, although subjects were in general very close to the actual values in every case, they were not very well calibrated to the slight differences that existed between cases.

Accuracy About Distribution Shapes

Subjects' guesses about distribution shapes showed a heavy bias toward assuming normality. All distributions, both actual and estimated, were defined (by a set of criteria that were necessarily somewhat arbitrary) to be either J Left (that is, central tendency on the extreme left of the scale), J Right, Bimodal, or Unimodal Symmetric (i.e., resembling a normal distribution).[3] Approximately half of the distributions defined by these criteria were coded as normal and a third each of the remainder as J Left, J Right, and Bimodal.

Table 2 shows the cross-tabulation of estimated and actual distribution types, pooled across behavioral and attitudinal dimensions. Subjects were overwhelmingly accurate at identifying normal distributions. Where the distribution was nonnormal, subjects' guesses either favored the actual distribution shape or favored a normal distribution, with the actual distribution shape coming in a strong second. These data indicate (a) very substantial accuracy in perception of distribution shapes and (b) an even more substantial bias in favor of seeing distributions as unimodal symmetric.

An interesting view of subjects' accuracy about all distributional parameters, including shape, may be seen in Figures 1 and 2. Figure 1 presents 16 of the 17 actual behavioral distributions and the average of all subjects' estimates about the distributions. (One of the three questions about alcohol consumption is not included to save space, but it is not notably different in any respect from the others.) Figure 2 presents all 8 of the 10-

[3] For example, to be designated unimodal symmetric, the highest point of a subject's 10-point scale distribution had to be within slots 3–8 and the second highest point had to be adjacent or, if not, then the difference between the second and third highest points had to be less than 5%. Figures 1 and 2 show how various curves ended up being classified by the system.

point attitudinal scale distributions and 8 of the 13, 5-point attitudinal scale distributions (the dropped distributions are not notably different from the retained ones). The curve shape for each actual distribution is indicated at the top of each distribution.

The reader is warned that the averaging of all estimated distributions allows for the possibility of greatly overestimating individual subject accuracy. With that caveat, it may be observed that accuracy about distribution shapes, at the group level, is remarkable indeed. Whatever individual biases there are in the perception of social distribution parameters, they tend to cancel out, save for the previously mentioned overestimates of the sheer amount of behavior of all kinds that people engage in and the mild overestimate of the standard deviation of both behavioral and attitudinal distributions. Among other things, this means that when 2 or more people pool their estimates of social distributions they normally would come closer to the truth rather than compounding their inaccuracy due to shared biases.

We have not yet examined the possibility that subjects show a substantial false consensus effect. Note that the overall accuracy portrayed in Figures 1 and 2 as well as the apparent bias toward normality could theoretically be produced entirely by false consensus. If each subject estimated the distribution by constructing a unimodal distribution with a mode corresponding to his or her own position, all the errors would cancel each other out when pooled together, and the resulting aggregated picture would be similar to that portrayed in Figures 1 and 2. Such a

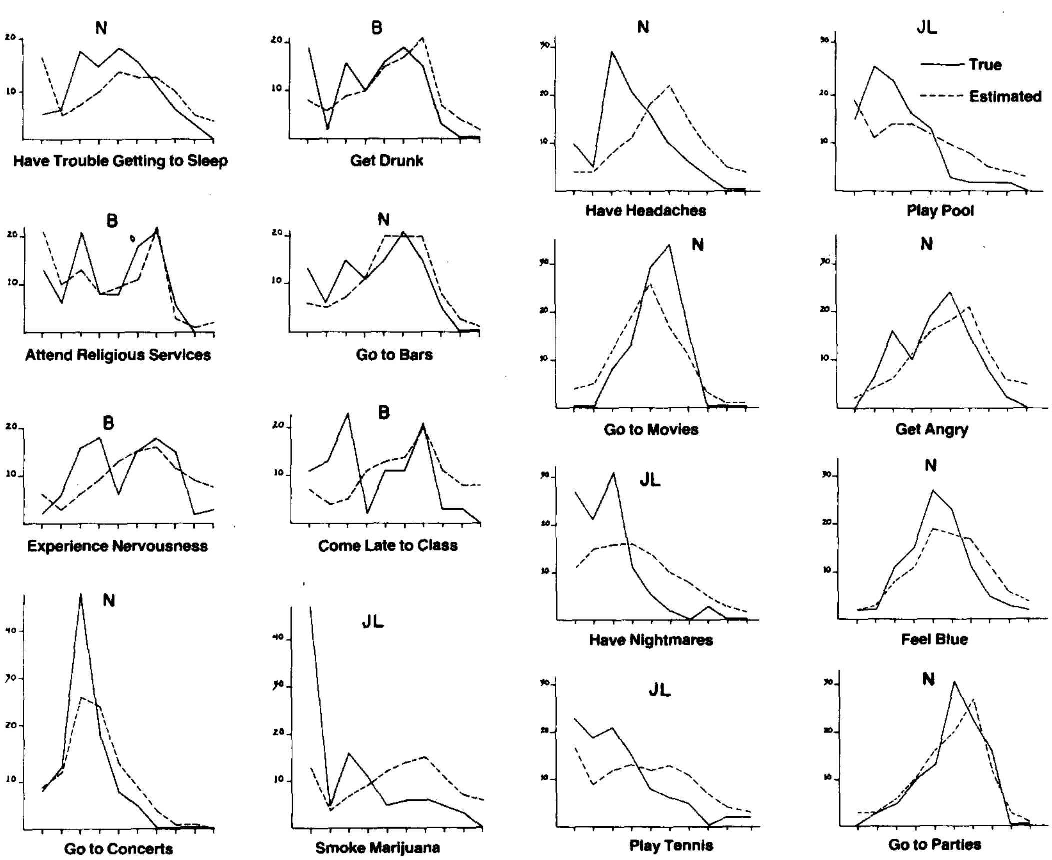

Figure 1. Actual and estimated distributions for behavioral items. Letters at the top of each distribution denote coded shape of actual distribution: N = Normal, JL = J Left, JR = J Right, B = Bimodal.

heuristic could also produce the apparent bias toward normality, because it is true even for the nonnormal distributions that the positions of a large proportion of subjects are located in the middle range of the scale; if these subjects used their own position as the sole basis for judging central tendency they would estimate the distribution to be normal. But such a strategy could not possibly produce any accuracy about dispersion—one's own position on a distribution provides no information about the variability of the distribution nor does one's own position on different distributions provide any information about their relative variability.

Examination of false consensus bias can only be achieved by asking the same subjects about their estimates of the population distributions and about their own locations in the distributions. (In Study 1, we did not want to contaminate estimates about distributions with reports of own behavior and attitude, or vice versa.) In Study 2, we asked both sets of questions of the same subjects. This made it possible to examine the degree of false consensus in estimates. The previous literature on false consensus does not allow for a very good estimate of the degree of error because in most studies the data were dichotomized, and it was shown merely that subjects tended to overestimate the number of people who behaved in the rough way they did or who held the approximate opinion they did.

Study 2: False Consensus in the Perception of Social Distributions

Method

One hundred three University of Michigan students enrolled in introductory psychology classes were presented

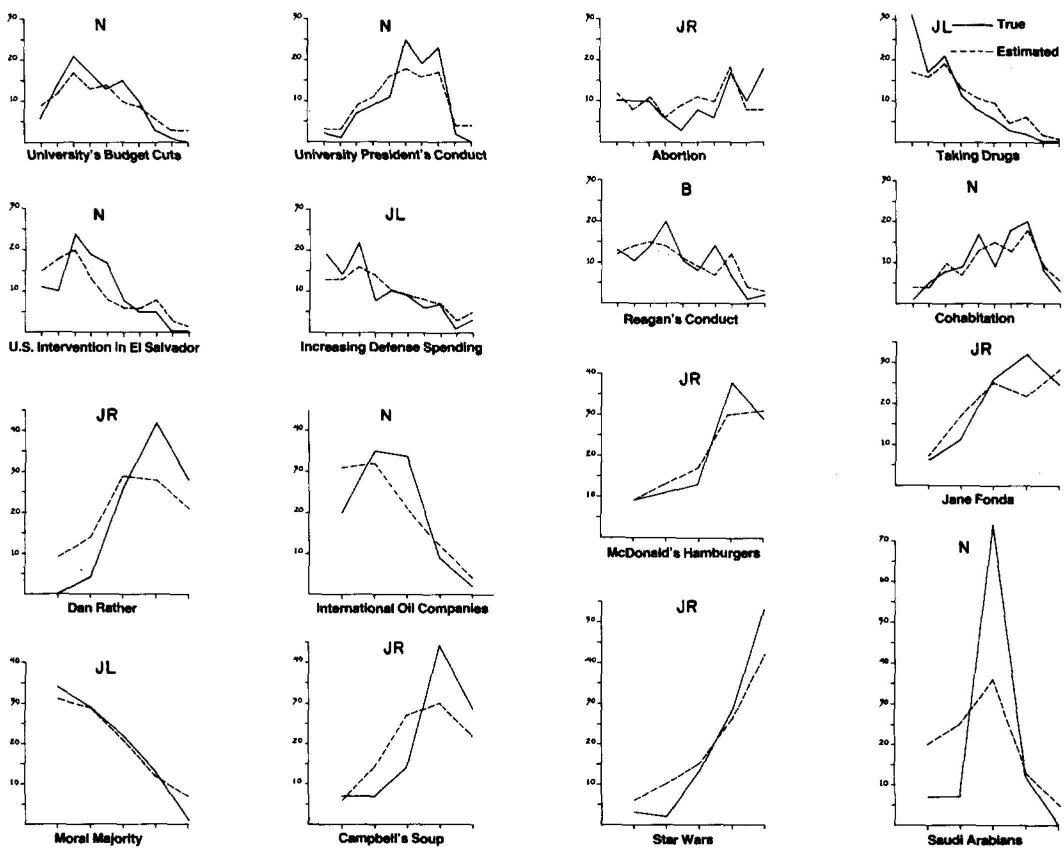

Figure 2. Actual and estimated distributions for attitudinal items. Letters at the top of each distribution denote coded shape of actual distribution: N = Normal, JL = J Left, JR = J Right, B = bimodal.

Table 3
Summary of the Results of Study 2

	Average correlation of each subject's estimates with the actual parameters	Overestimation of parameters	Average absolute deviation of estimates from parameters	Size of randomly drawn sample with same absolute deviation
Central tendency				
Behaviors	.55 ± .04	yes	.95	2
Attitudes	.56 ± .10	no	1.18	2.36
(5-point)			.60	
Dispersion				
Behaviors	.44 ± .04	9%	.43	7
Attitudes	.25 ± .06	15%	.63	7.29
(5-point)			.26	

with the behavioral items in Study 1 and were asked both to indicate their own position on the scale and to distribute 100 students enrolled in introductory psychology over the 10 scale points. (The reference population differs from that in Study 1, where subjects were asked about University of Michigan students. The match between actual population and the description of the population given to subjects was thus closer in Study 2 than in Study 1.) Another 120 introductory students were presented with the attitudinal items in Study 1 and were asked both to indicate their own position on the scale and to distribute 100 introductory students over the 10 (or 5) scale points. For both behavioral and attitudinal items, half the subjects answered for themselves first and half gave estimates about the distributions of other subjects' reports first. Procedure was otherwise identical to that in Study 1.

Results

As may be seen in Table 3, the major analyses produced results virtually identical to those of Study 1. Significance levels tended to be higher, however, because the N was greater.

False Consensus and Accuracy about Means

There was a decided false consensus effect, but it was not of great magnitude, either for behaviors or for attitudes.

Behaviors. The average correlation, across dimensions, between subjects' own behavioral level and the mean of their estimated distributions was .28 ($p < .01$; the correlation was .23 when subjects indicated their own response first and .34 when they gave estimates about the distribution first). For all of the behavioral dimensions the average subject estimated the mean of the distribution to be closer to its actual mean than to the subject's own level: All but one of the estimated means were closer to the actual mean than to the subject's own level at $p < .01$ (though it should be noted that these are descriptive only because of lack of independence). The average discrepancy between the subject's guess about the mean and the actual mean was .95, whereas the average discrepancy between the subject's own value and the actual mean was 1.95; $t(118) = 12.95$, $p < .001$.

Attitudes. The average correlation between subjects' own attitudes and the mean of their estimated distributions was .32 ($p < .001$; the correlation was .34 when subjects indicated their own attitude first and .28 when they gave their estimates about the population first). For all but one of the attitudinal dimensions, the average subject estimated the mean of the distribution to be closer to its actual mean than to the subject's own attitude. All but seven of the estimated means were closer to the actual mean than to the subject's own attitude at $p < .01$. The comparison of the overall average discrepancies, which were .80 for estimate versus actual and 1.17 for own versus actual, was highly significant, $t(98) = 9.95$, $p < .001$.

Subjects' estimates of means are thus influenced by their own values, but this influence is not great and their estimates of the means are substantially closer to the actual mean than to their own level. Thus, subject's own value is not the exclusive, or even the major, contribution to accuracy about means.

False Consensus and Distribution Shape

There was a decided relation between subjects' own positions and the shape of their

Table 4
*Percentage of Subjects Whose Position Corresponds to J-Left, Normal, or J-Right Curves, Estimating the Curve to be Each of the Possible Curve Shapes, for Curves That are in fact J Left, Normal, and J Right**

Actual curve	n	Subjects' position	Subjects' estimates: J Left	Normal	J Right	Bimodal
J Left	196	JL	42	34	3	21
	199	N	18	50	3	29
	9	JR	0	44	12	44
Normal	232	JL	33	37	1	29
	1602	N	7	69	2	21
	73	JR	8	27	29	36
J Right	25	JL	0	16	8	76
	409	N	5	43	32	20
	250	JR	10	8	69	14

* Actual bimodal curves were not included in this analysis because a subject's position cannot correspond to a bimodal curve.

estimated distributions, suggesting that own position played a significant, though not a singular role in determining subjects' estimates of shape. To examine this relation we pooled together all the J-Left curves, all the Normal curves, and all the J-Right curves for attitudes and behaviors. For each curve shape we identified the subjects whose own positions were located at the extreme left of the distribution, the subjects whose own positions were in the middle range, and the subjects whose own positions were at the extreme right of the distribution.

If subjects were relying entirely on their own position (estimating the curve to be unimodal with a mode located at their own position), then these three groups of subjects would be expected to estimate the curve shapes, respectively, as J Left, Normal, and J Right, and no subject would be expected to estimate the curves as Bimodal. Table 4 presents, for curves that are J Left, Normal, or J Right, the percentage of subjects whose own positions were in each of the three range categories who estimated the curves to be each of the possible shapes.

It may be seen first in Table 4 that own position clearly played a role in estimates of curve shape. For example, in the first and second rows of Table 4, for J-Left curves, subjects whose own positions were at the extreme left favored J-Left curves in their estimates, whereas subjects whose own positions were in the central range favored normal curves. And a similar pattern is found for J-Right curves, where subjects whose own positions were at the extreme right overwhelmingly favored J-Right curves in their estimates, whereas subjects whose own positions were in the central range favored normal curves. Further, for each actual curve shape the highest accuracy rate (i.e., percentage of correct identifications) is found for subjects whose own positions corresponded to the actual distribution shape.

Thus there is no question that subjects' own positions influenced their guesses about distribution shape. But it is equally clear that false consensus could not be the only mechanism influencing subjects' guesses. First, as noted earlier, if false consensus were the only mechanism, no subject would estimate the distribution to be bimodal. Yet, on average, 27% of the guesses are bimodal.

More strikingly, in most cases the majority of subjects do not believe the distribution shape to correspond to their own positions. The only two exceptions to this are for cases where subjects' own positions do in fact correspond to the actual curve shape. Further, it may be seen that subjects appear to know when their own position is extremely different from that of the modal person. Thus, for J-Right curves, not one of the subjects whose own positions were in the extreme left range made the serious error of estimating the curve to be J Left, and for J-Left curves only 12% of the subjects whose own positions were in the extreme right estimated the curves to be J Right.

The overall extent of false consensus may be gauged from the following comparison. The average probability of estimating the distribution shape as corresponding to one's own position when one's own position does correspond to the actual distribution shape is 60%. But the average probability of estimating the distribution shape as corresponding to one's own position when one's own position does not correspond to the actual shape is only 28%. The difference between the two percentages reflects the impact of forces other than knowledge of one's own position that affect subjects' estimates.

Another important finding in Table 4 is that the apparent bias toward normality appears to have been due in part to false consensus. Subjects whose own positions were not in the normal range show only a slight preference for normal curves. These data suggest that the tendency to view distributions as normal is a rather weak default for subjects who are not themselves located fairly near the center of the distribution.

Discussion

In general, we find subjects' estimates about social distribution parameters to be surprisingly close to the actual values. They were not overwhelmingly accurate about any single parameter, as evaluated by any given type of analysis, and they showed several types of systematic bias. The errors, however, were not very large and the biases underlying the errors do not seem to be of very great magnitude. We begin with a review of the biases and then return to an assessment of the likely real world accuracy that people might be expected to display.

Biases in the Perception of Social Distributions

The results provide strong evidence for four different sources of bias in estimates of distributional parameters for social dimensions.

1. Subjects overestimated the degree of dispersion. The extent of the overestimation is not great—a little more than a 10% overestimate of standard deviation on average across studies and across types of social dimensions—but the overestimation was quite systematic. The most natural way to understand this error is in terms of the availability heuristic. Extreme behaviors and attitudes are more salient than nonextreme ones, entirely aside from the fact that people who behave in extreme ways or who hold extreme attitudes often take steps to ensure that their behavior or attitudes are highly salient. When people try to estimate dispersion, the extreme examples will be more available than they are frequent.[4]

2. Subjects overestimated the means of behavioral distributions. The extent of the overestimation was not great, but it was highly reliable. It is not clear why people should overestimate the sheer frequency of behavior of most kinds. Perhaps the explanation is similar to the explanation for overestimation of dispersion. Behavior is more salient than nonbehavior, thus when one comes to estimate the frequency of behavior for people on some dimension the behavers are more salient than the nonbehavers and contribute disproportionately to the outcome. There is of course no comparable phenomenon for attitudes, because it is both extremes of the dimension that are salient rather than just one, and we in fact found no systematic tendency to displace the means of attitude scales in one direction or the other. This explanation is consistent with the literature on the feature-positive effect, which documents people's tendency to ignore or underuse nonoccurrences when making judgments and solving problems. This effect has been demonstrated for a diverse range of domains including, for example, animal and human learning (Jenkins & Sainsbury, 1970; Sainsbury, 1983), judgment of contingency (Nisbett & Ross, 1980; Ward & Jenkins, 1965), and self-perception (Fazio, Sherman, & Herr, 1982).

[4] An alternative explanation for the overestimation of dispersion should be noted. This is the trivializing possibility that our method of presenting the subjects with highly dispersed scale values encouraged them to use those extreme values, whereas had they spontaneously generated, say, a range, they might not have overestimated dispersion.

3. Subjects skewed the central tendencies of distributions in the direction of their own level on the distribution, for both behaviors and attitudes. The average distortion of these parameters due to false consensus was not great, however. Subjects' estimates of distribution shapes were also influenced to some extent by their own positions. The mechanism underlying these false consensus effects is again most probably the availability heuristic. One always has an estimate for at least one's own level on a given dimension. Only under special conditions, such as having unequivocal knowledge of a number of people's positions, or holding a theory that one is unusual on a particular dimension, does it seem likely that knowledge of own position would fail to have an effect on the estimate for the distribution as a whole.

4. Subjects showed a weak bias toward characterizing distributions as normal. It is our guess that this tendency would work toward producing accuracy in most circumstances. It is of course impossible to know, because of unanswerable sampling questions and scaling questions, whether normal distributions are the rule for social events. If they are, the bias is clearly useful. People would be well-served by using their point estimates (knowledge of their own levels on particular dimensions and those of their friends) as inputs into a formula assuming normality. This typically would produce a characterization of the distribution that is accurate and that is expressible with great economy in terms of psychological parameters corresponding to mean and standard deviation.

Accuracy in the Perception of Social Distributions

The biases noted would not serve, of themselves, to produce serious inaccuracy in the estimation of social distributions. And one of them, the false consensus bias, is a very useful heuristic to employ in the absence of other knowledge: For most of the distributions we examined, the majority of people would be right to assume that most other people's stances are not very different from their own.

Indeed, the major lesson that we draw from our data is that people are skilled in estimating social distributions of populations with which they are familiar. They know what major kinds of distributions are possible and they know which of these are most likely. For all distribution types examined, they show a strong tendency to guess the correct type. In addition, their estimates of the central tendency and dispersion of distributions are fairly well-correlated with the actual parameters. For estimates of the means for distributions, a random sample of 2 to 4 cases from actual distributions would be required to exceed the accuracy of the average subject's guesses; for standard deviations a random sample of 6 to 10 cases would be required.

Our data thus make it clear that the errors people make in inductive reasoning about social events are not due to any fundamental incapacity to characterize the central tendencies, dispersions, and shape of social distributions.

Note also that the reference population is not one that would be expected to display subjects' abilities for parameter estimation to their best advantage. The University of Michigan undergraduate body is a large and highly diverse population. Had we studied a small college population or had we asked our subjects to estimate parameters for some subset of the Michigan population with which they were personally extremely familiar, such as people in their major field or fellow athletes or sorority members, there is every reason to assume we would have found more accuracy than we did (cf. Judd & Johnson, 1981).

On the other hand, it should be clear that although our studies do not display subjects' parameter estimation abilities to their best advantage, they probably also do not display them to their worst advantage or even at their ecologically typical level. There is good reason to suspect, for example, that people would be far less accurate about dispersion for groups of which they are not themselves members. Work by Quattrone (in press; Quattrone & Jones, 1980) indicates that people substantially underestimate dispersion for outgroups.

What our studies show is that when subjects are explicitly requested to generate social distributions for a large and diverse group of which they are members, they can do so with substantial accuracy. This does not mean that people spontaneously recall or construct social distributions for most of the social judgment problems that require them. On the contrary, there is evidence in the work by Nisbett, Krantz, Jepson, and Kunda (1983) that the distributions of social dimensions are often not salient and that it is only when subjects are specifically cued to the necessity of constructing them that they do so. Without such cuing, subjects sometimes made inferences as if they believed that the relevant population was either uniform or essentially infinitely variable. For the purposes of education, then, it might be profitable to emphasize the necessity of considering social distributions for various classes of problems. The present work indicates that college students, at least, will not need much help in constructing such distributions when they understand the need for doing so.

Constructing Social Distributions

How do people construct social distributions? Our attempts to answer this question will be necessarily speculative, inasmuch as our studies were not designed to address it.

Everyone knows his or her own location on each of the dimensions we examined, and this could serve as a beginning reference point in estimating distribution parameters. Indeed, it is highly likely that our subjects did use this as a reference point, given that there was a false consensus effect for estimation of the mean and of the distribution shape.

Our data also indicate strongly, however, that false consensus could not possibly be the only factor influencing the construction of such distributions. False consensus cannot account for the considerable accuracy about dispersion, because one's own position does not provide any relevant information. And our data demonstrate that false consensus cannot fully account for the accuracy about central tendencies and distribution shapes either. Estimated means were closer, on average, to the actual values than to subjects' own positions, and subjects estimated the distribution shapes as corresponding to the shapes implied by their own positions much more when there was a genuine correspondence than when there was not.

We therefore believe that when constructing distributions, subjects rely not only on their own position but also on additional accurate knowledge. For most of the dimensions we examined, subjects could be expected to have reasonably accurate memories for the location of at least several other people. Some of these memories could produce more error than accuracy, if they are more memorable than they are typical. But in general, memory of actual cases could be expected to promote accuracy.

In addition to memories of actual cases and knowledge about the specific item at hand, subjects undoubtedly have theories about the kind of item in question and about social behavior and attitudes in general. For example, although subjects might have little knowledge about the actual attitudes of many of their fellow students toward increasing defense spending, they might view this issue as the kind of issue heavily saturated with right–left ideological orientation and might have reasonably accurate estimates of the percentage of the student population occupying various locations on this continuum. And, at the most general level, people seem to have tacit beliefs about the likely distribution shapes for social dimensions, just as they do for physical dimensions. Given knowledge about one's own position, reasonably accurate memory for a few cases, and a good guess about the shape of the underlying distribution, subjects could generate quite accurate estimates of the mean and standard deviation of the distribution.

These considerations make it seem less mysterious why subjects were as accurate as they were in their guesses about various parameters of social dimensions. But it should be remembered that they are purely post hoc. Indeed, as should be clear by now, we were quite surprised by the accuracy subjects displayed. Prior to conducting the research, we thought only of mechanisms that might produce error.

References

Campbell, D. T. (1967). Stereotypes and the perception of group differences. *American Psychologist, 22,* 817–829.

Child, I. L., & Doob, L. W. (1943). Factors determining national stereotypes. *Journal of Social Psychology, 17,* 203–219.

Fazio, R. H., Sherman, S. J., & Herr, P. M. (1982). The feature-positive effect in the self-perception process: Does not doing matter as much as doing? *Journal of Personality and Social Psychology, 42,* 404–411.

Fields, J. M., & Schuman, H. (1976). Public beliefs about the beliefs of the public. *Public Opinion Quarterly, 40,* 427–448.

Flannagan, M., Fried, L. S., & Holyoak, K. J. (1984). Induction of the distributional structure of perceptual categories. Unpublished manuscript, University of Michigan.

Fong, G. T., Krantz, D. H., & Nisbett, R. E. (1984). Improving inductive reasoning through the application of statistical heuristics to everyday problems. Unpublished manuscript, University of Michigan.

Fried, L. S., & Holyoak, K. J. (1984). Induction of category distributions: A framework for classification learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 10,* 234–257.

Hamill, R., Wilson, T. D., & Nisbett, R. E. (1980). Insensitivity to sample bias: Generalizing from atypical cases. *Journal of Personality and Social Psychology, 39,* 578–589.

Jenkins, H. M., & Sainsbury, R. S. (1970). Discrimination learning with the distinctive feature on positive or negative trials. In D. Mostofsky (Ed.), *Attention: Contemporary theory and analysis.* New York: Appleton-Century Crofts.

Jepson, C., Krantz, D. H., Nisbett, R. E. (1983). Inductive reasoning: Competence or skill? *Behavioral and Brain Sciences, 6,* 494–501.

Judd, C. M., & Johnson, J. P. (1981). Attitudes, polarization, and diagnosticity: Exploring the effect of affect. *Journal of Personality and Social Psychology, 41,* 26–36.

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology, 3,* 430–454.

Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. *Psychological Review, 80,* 237–251.

Kelley, H. H. (1967). Attribution theory in social psychology. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (Vol. 15, pp. 192–240). Lincoln: University of Nebraska Press.

Krantz, D. H., Fong, G. T., & Nisbett, R. E. (1984). Formal training improves the application of statistical heuristics to everyday problems. Unpublished manuscript, Bell Laboratories, Murray Hill, NJ.

Kunda, Z., & Nisbett, R. E. (1984). The psychometrics of everyday life. Unpublished manuscript, University of Michigan.

Nisbett, R. E., Krantz, D., Jepson, C., & Kunda, Z. (1983). The use of statistical heuristics in everyday inductive reasoning. *Psychological Review, 90,* 339–363.

Nisbett, R. E., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment.* Englewood Cliffs, NJ.: Prentice-Hall.

Peterson, C. R., & Beach, L. R. (1967). Man as an intuitive statistician. *Psychological Bulletin, 68,* 29–46.

Posner, M. I., & Keele, S. W. (1968). On the genesis of abstract ideas. *Journal of Experimental Psychology, 77,* 353-363.

Quattrone, G. A. (in press). On the perception of a group's variability. *The psychology of intergroup relations,* Vol. II.

Quattrone, G. A., & Jones, E. E. (1980). The perception of variability within in-groups and out-groups: Implications for the law of large numbers. *Journal of Personality and Social Psychology, 38,* 141–152.

Ross, L., Greene, D., & House, P. (1977). The false consensus phenomenon: An attributional bias in self-perception and social perception processes. *Journal of Experimental Social Psychology, 13,* 279–301.

Rothbart, M., Fulero, S., Jensen, C., Howard, J., & Birrell, P. (1978). From individual to group impressions: Availability heuristics in stereotype formation. *Journal of Experimental Social Psychology, 14,* 237–255.

Sainsbury, R. S. (1983). Discrimination learning using positive or negative cues. *Canadian Journal of Psychology, 27,* 46–57.

Sherif, M., Harvey, O., White, B., Hood, W., & Sherif, C. (1961). *Intergroup conflict and cooperation: The robber's cave experiment.* Norman, OK: Normal Institute of Group Relations, University of Oklahoma.

Snedecor, G. W. (1946). *Statistical methods.* Ames, Iowa: The Iowa State College Press.

Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American, 223,* 96–102.

Thagard, P., & Nisbett, R. E. (1982). Variability and confirmation. *Philosophical Studies, 47*(2), 188–202.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5,* 207–232.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185,* 1124–1131.

van der Pligt, J. (1984). Attributions, false consensus, and valence: Two field studies. *Journal of Personality and Social Psychology, 46,* 57–68.

Vinacke, W. E. (1949). Stereotyping among national-racial groups in Hawaii: A study in ethnocentrism. *Journal of Social Psychology, 30,* 265–291.

Ward, W. D., & Jenkins, H. M. (1965). The display of information and the judgment of contingency. *Canadian Journal of Psyhology, 19,* 231–241.

Received May 21, 1984 ■