COMPUTERS IN TEACHING

A Computerized Demonstration of the False Consensus Effect

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Students in an advanced undergraduate laboratory course on social cognition replicated an experiment on the false consensus effect (Krueger & Clement, 1994). Interacting with a computer program, students viewed 40 statements. For each statement, they indicated whether they personally endorsed it, estimated the proportion of the population that would endorse it, and rated its social desirability. Half the students received feedback on the actual consensus in the population after making each consensus estimate, and the remaining students did not. Students analyzed data using a spreadsheet program. They found the traditional false consensus effect as item endorsers gave higher consensus estimates than did nonendorsers. They also found reliable within-subjects correlations between item endorsements and estimation errors, demonstrating the truly false consensus effect. Students also learned that feedback about the actual consensus does not reduce bias.

Students are often intrigued by research on egocentric biases in social perception. One of these biases is the tendency of people to expect that their own social behaviors are common in the population. For example, people who hold a certain attitude tend to feel that this attitude is more prevalent than do people who do not hold this attitude. In a classic study, Ross, Greene, and House (1977) demonstrated this false consensus effect (FCE) by asking students whether they would walk around campus wearing a sandwich board with the message "Repent" or "Eat at Joe's." On the average, students who complied estimated that 61% of their peers would comply; students who did not comply estimated that only 30% would comply. The FCE has been shown with a range of item types, including abilities and opinions (Campbell, 1986), fears (Suls & Wan, 1987), habits and preferences (Sherman, Chassin, Presson, & Agostinelli, 1984), and personality inventory statements (Krueger & Clement, 1994). In our experience, it is easier to convince students that most people show the FCE than it is to convince them that they, too, are liable to show the effect. Ironically, some students believe that they are unique in that they would not fall prey to this projective bias.

To demonstrate the FCE and to teach students its conceptual and statistical properties, we adapted a research study (Krueger & Clement, 1994, Experiment 1) for use in an advanced laboratory course. Most of the necessary analyses (e.g., *t* tests and correlations) had been covered in the prerequisite introductory statistics course. We introduced additional methods in class lectures (e.g., the standardization of correlation coefficients and the binomial distribution). In this article, we present these methods in detail so that instructors may adapt the procedures to their own laboratory courses or to in-class demonstrations.

Traditionally, the FCE has been measured as the mean difference in consensus estimates by those who endorse an item and those who do not. That is, subjects are assigned to conditions on the basis of their endorsements. This single-item, between-subjects approach has a serious limitation. Consider an individual who does not have any information about the actual percentage of agreement with the item (actual consensus). In statistical terms, this person's endorsement is a sample of 1 drawn from the population of all responses. Because such a sample is more likely to represent the majority than the minority, this person should believe that he or she is in the majority. Because endorsers and nonendorsers have different sample information (i.e., their own responses differ), they should give different estimates about the population (Dawes, 1989; Hoch, 1987; Krueger & Zeiger, 1993). Thus, the traditional analysis is inconclusive because it is affected by truly false consensus effects (TFCEs) and by statistically adequate inferences.

To separate adequate inductive inferences and false consensus, we followed the idiographic approach involving multiple-judgment items (Krueger & Clement, 1994; Krueger & Zeiger, 1993). In this approach, correlations are computed for each subject across items. A person shows *simple projection* if that person expects that most of his or her responses are those of the majority. That is, the person's consensus estimates are positively correlated with endorsements across items. Again, simple projection does not necessarily indicate bias because, by definition, most people respond like the majority to most items. A *self-validity* index captures the degree to which a person's responses predict the population's responses. The index is computed by correlating endorsements with actual consensus. TFCEs occur when a person's item endorsements are systematically related to the estimation errors (i.e., the over- or underestimation of consensus). The TFCE is computed by subtracting the actual consensus from the estimated consensus and correlating the differences with endorsements. *Correlational accuracy* is the degree to which estimated and actual consensus are correlated. A positive correlation indicates that the person correctly differentiates items with which most people agree from items with which most people disagree.

In sum, the idiographic approach allows students to check for themselves whether (a) they project, (b) their endorsements are valid predictors of actual consensus, (c) their endorsements predict their estimation errors (i.e., TFCEs), and (d) their consensus estimates are accurate. The idiographic approach also provides statistical controls for the possibility that consensus bias is a by-product of social desirability effects. People may view items they endorse as socially desirable and believe that desirable items are more popular (Sherman et al., 1984). If there are such social desirability effects, the correlation between endorsements and consensus estimates should disappear when social desirability ratings are statistically controlled.

Krueger and Clement (1994, Experiment 1) reported that the mean indices of simple projection, TFCE, self-validity, and accuracy were reliable. Moreover, the TFCE remained when social desirability ratings were controlled, and it was not reduced when students received feedback about the actual consensus after each consensus estimate. In our laboratory activity, students can discover these robust effects in a self-relevant and hands-on manner. They collect all the relevant data and determine the strength of the effect both on the group level and for their own idiosyncratic judgments.

Method

Participants and Apparatus

Seventeen undergraduate psychology majors participated in an upper level laboratory course on social cognition. They worked independently on Macintosh IIci computers that controlled all stimulus presentation and data collection.

Materials

Forty items from the Minnesota Multiphasic Personality Inventory (MMPI–2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989) were the stimulus materials. Actual consensus percentages, which were needed for the computation of the indices of TFCE, self-validity, and accuracy (for details on item selection, see Krueger & Clement, 1994) were drawn from the inventory manual.

Design and Procedure

All students participated in the experiment before reading the course materials or attending lectures on the FCE. In a three-phase procedure, students made three judgments for each statement: their own endorsement, a social desirability rating, and a consensus estimate. In Phase 1, the statements appeared on the computer screen one at a time (e.g., "I seldom worry about my health."). Students indicated their own endorsement by clicking the mouse at one of two buttons (labeled *agree* or *disagree*). In Phase 2, students saw each statement again and rated the desirability of agreement by entering a number from 1 (*socially undesirable*) to 9 (*socially desirable*). In Phase 3, students estimated the percentage of people who would agree with the item (0% to 100%).

Presence versus absence of feedback was the independent variable. Half the students saw the actual consensus after each estimate. In theory, these students may detect whether they consistently over- or underestimate the consensus. Over a series of items, they may use this information to reduce bias and improve accuracy. The remaining students did not have this feedback and were not expected to reduce bias.

Instructors compiled the data into spreadsheets and tutored the students in the use of the program (Microsoft Excel 4.0, 1992). In subsequent laboratory meetings, students performed two types of data analyses: the conventional between-subjects test of the FCE and within-subjects correlations for tests of simple projection, self-validity, TCFE, and accuracy.

Results

Between-Subjects Analyses

Average estimates by endorsers and nonendorsers appear in Table 1. Differences in estimates were in the predicted direction for 32 of the 40 items (80%). Due to the small sample size, students did not perform between-subjects analyses for individual items. Instead, they performed a t test for dependent samples on the means of the 80 mean estimates (i.e., 40 means for item endorsers and 40 means for nonendorsers). This analysis treated items rather than students as cases. As expected, endorsers gave higher estimates ($M = 55.8$) than did nonendorsers ($M = 41.9$), demonstrating the classic FCE, $t(78) = 5.0, p < .001$.

Within-Subjects Correlations

First, students computed the within-subjects correlations for simple projection, self-validity, TFCE, and correlational accuracy. Then, they recomputed the TFCE and simple projection as partial correlations, controlling for social desirability. To do this, they computed two additional sets of zero-order correlations: the correlations between endorsements and social desirability ratings, ($r_{(\text{endorsement, } SD)}$) and the correlations between estimates and social desirability, ($r_{(\text{estimate}, SD)}$). Using the following formula (Hays, 1988, p. 611), students computed the partial correlation for the TFCE:

$$r_{(\text{endorsements, error} \times SD)} = \frac{r_{(\text{endorsement,error})} - r_{(\text{endorsement},SD)} r_{(\text{error},SD)}}{\sqrt{(1 - r^2_{(\text{endorsement},SD)})(1 - r^2_{(\text{error},SD)})}} \,. \quad (1)$$

Substituting consensus estimates for the error scores in this equation gave the partial correlation for simple projection.

Second, students compared the prevalence of the TFCE in the sample with the null hypothesis that positive and negative TFCEs are equally likely to occur. To perform this analysis, students counted the number of positive TFCE correlations (14 of 17 = 82%) and calculated the probability of obtaining a result at least this extreme. The binomial expansion (Hays, 1988, p. 131) gave the probability of an exact number of successes assuming that the null hypothesis was correct:

Table 1. Average Estimates by Endorsers and Nonendorsers and MMPI–2 Actual Consensus.

Item		Endorsement Yes	Endorsement No	Actual
1	I sweat very easily even on cool days.	30.8	19.6	21
2	My conduct is largely controlled by the behavior of those around me.	56.5	45.3	28
3	My hardest battles are with myself.	57.9	30.0	73
4	I like to be with a crowd who play jokes on one another.	64.5	31.3	24
5	I have very few fears compared to my friends.	67.7	44.8	54
6	I like poetry.	54.3	42.5	62
7	I am easily awakened by noise.	47.9	48.8	48
8	I never indulged in any unusual sex practices.	70.0	57.9	70
9	I seldom worry about my health.	60.0	23.9	64
10	I enjoy reading love stories.	53.5	35.2	47
11	I like to let people know where I stand on things.	66.5	75.0	75
12	I certainly feel useless at times.	61.3	46.0	36
13	At times I have very much wanted to leave home.	76.4	41.0	37
14	It does not bother me that I am not better looking.	45.0	24.6	60
15	I think I would like the kind of work that a forest ranger does.	31.3	25.4	51
16	In school I found it very hard to talk in front of the class.	50.0	55.0	56
17	I am neither gaining nor losing weight.	51.2	52.5	65
18	I would like to be a singer.	45.0	26.8	43
19	I used to keep a diary.	56.3	54.5	40
20	I enjoy a race or a game more when I bet on it.	78.8	37.3	30
21	I think most people would lie to get ahead.	69.0	40.0	48
22	I worry over money and business.	72.3	56.9	54
23	I work under a great deal of tension.	69.2	46.7	37
24	I have no fear of spiders.	44.6	48.5	52
25	I am embarrassed by dirty stories.	60.0	34.9	29
26	I enjoy detective or mystery stories.	56.4	37.7	67
27	I am a very sociable person.	67.9	62.5	71
28	I like to read newspaper articles on crime.	59.4	37.3	45
29	Criticism or scolding hurts me terribly.	55.4	39.3	47
30	I like to go to parties or other affairs where there is lots of loud fun.	65.5	67.5	42
31	I have very few headaches.	51.8	44.2	80
32	I like collecting flowers or growing house plants.	38.4	44.3	61
33	My sex life is satisfactory.	63.0	32.3	74
34	I have never done anything dangerous for the thrill of it.	41.7	41.5	39
35	I do not mind being made fun of.	57.5	24.5	36
36	I like dramatics.	47.0	46.4	63
37	I often think, "I wish I were a child again."	68.1	52.9	22
38	I am so touchy on some subjects that I can't talk about them.	35.0	43.5	25
39	My eyesight is as good as it has been for years.	40.0	30.5	57
40	I do not worry about catching diseases.	45.0	29.1	64

Note. MMPI–2 = Minnesota Multiphasic Personality Inventory (Butcher, Dahlstrom, Graham, Tellegen, Kaemmer, (1989).

$$p(r;N,p)=\left(\frac{N!}{r!(N-r)!}\right)p^r q^{N-r}, \qquad (2)$$

where N was the sample size (17), r was the number of successes (14 positive correlations), and p and q were the probabilities of success and failure ($p = q = .5$). Summing the exact binomial probabilities of obtaining 14 or more successes out of 17 events gives the overall probability of .0063. This low probability suggests that the high number of positive correlations did not result from chance. When social desirability was controlled, 13 students (76%, $p < .05$) had positive TFCE correlations. Then, students computed binomial probabilities for the zero-order and partial correlations indicating simple projection (both $ps < .001$). This time, they used Excel's BINOMDIST (Microsoft, 1992) function.

Third, once the prevalence of the bias was established, students examined the mean effect sizes. Before testing specific hypotheses, students transformed the correlations to Fisher Z scores using the following formula (McNemar, 1962):

$$Z=\frac{1}{2}\ln\left(\frac{1+r}{1-r}\right). \qquad (3)$$

Z scores, unlike correlation coefficients, are normally distributed and can be analyzed with parametric statistics. Table 2 displays the mean correlation coefficients that resulted from reverse transformations from the mean Z scores. The formula for the reverse transformation was as follows:

$$r=\frac{e^{(2Z)}-1}{e^{(2Z)}+1}. \qquad (4)$$

We encouraged students to compute the transformations by specifying the necessary calculations in the command line of the spreadsheet. Later, we gave them the option to transform correlation coefficients to Fisher Z scores by using Excel's FISHER (Microsoft, 1992) function and to do the reverse transformations by using the Excel's FISHERINV function.

Table 2. Average Within-Subjects Correlations as a Function of Level of Feedback.

	Feedback		
	Yes	No	*M*
Zero-order correlations			
TFCE	.20*	.31*	.26*
Simple Projection	.43*	.40*	.42
Self-Validity	.20*	.05	.13*
Accuracy	.16	.01	.08
Partial Correlations			
TFCE × SD	.06	.33*	.19*
Simple Projection × SD	.36*	.43*	.39*

Note. TFCE = truly false consensus effects; SD = social desirability.
*$p < .05$

Students compared the average Z scores with zero using two-tailed *t* tests. They divided each average Z score by its standard error (i.e., the standard deviation divided by the square root of the number of observations) and compared the resulting *t* values with the critical values in a *t* table with $n - 1$ degrees of freedom. Effects at the .05 level or better were accepted as reliable. As is evident from the table, levels of simple projection, TFCE, and self-validity were reliable, but the level of correlational accuracy was not. Students also discovered that simple projection and TFCE were reliable when social desirability was controlled. The *t* tests for dependent samples indicated that the partial correlations were not reliably smaller than the zero-order correlations, simple projection: $t(16) = 1.3$; TFCE: $t(16) = 1.9, p = .08$.

To test the hypothesis that feedback reduces bias, students compared the projection indices obtained in the feedback and no-feedback conditions using t tests for independent samples. Feedback did not reduce TFCE, $t(15) = 1.0$, *ns*; or simple projection, $t(15) < 1$, *ns*. Feedback did not improve accuracy, $t(15) = 1.4$, *ns*; or self-validity, $t(15) = 1.5$, *ns*. When the effect of social desirability was controlled, feedback reduced TFCE, $t(15) = 2.2, p < .05$, *ns*; but not simple projection, $t(15) < 1$, *ns*.

Discussion

Students replicated most of our original findings in a data set containing their own responses. Simple projection and TFCE were reliable and were not reduced by feedback about actual consensus or statistical control of social desirability. The analyses reported in this article were the minimum we required for this exercise. We encouraged students to develop and test their own hypotheses. For instance, the between-subjects analyses could be performed as a 2(feedback) × 2(endorsement) analysis of variance with repeated measures on the second variable. Students could also use this data set to explore another ego-related bias, self-enhancement: They could examine whether people who endorse an item rate it to be more socially desirable than do people who do not endorse it.

We developed this demonstration for an advanced laboratory course in which we devoted 2 weeks of the semester to the study of egocentrism. During this time, students acquired the necessary theoretical background, reviewed old and learned new statistical skills, and collected and analyzed their own data. The demonstration is sufficiently flexible to be adapted to other teaching formats. With paper, pencils, and pocket calculators, some of the work can be done in the classroom (Kite, 1991). The use of computers is essential, however, for the online feedback of actual consensus. Because this demonstration emphasizes the teaching of experimental design and statistical analysis, it may also be useful for courses on research methods.

During the 2 weeks following the demonstration, students wrote reports in the style used by the American Psychological Association (1994). In discussing their findings, they relied on primary sources and lectures on the FCE and other ego-related biases in social perception. Class lectures put the exercise into its historical context, ranging from the beginnings of projection research (Katz & Allport, 1931) to contemporary attributional (Gilovich, Jennings, & Jennings, 1983) and Bayesian approaches (Dawes, 1989). The findings and lectures fueled discussions concerning the nature of the FCE. Laboratory reports and class discussions showed that students had learned the relevant theoretical issues and that they had acquired the skills necessary for empirical study. Most students found it intriguing that the FCE is so robust across time, stimulus items, and individuals. Yet, some continued to doubt that they themselves could be biased. One student humored the class unwittingly by saying, "I, like most people, do not generalize from myself to others."

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Notes

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