Responsibility Diffusion in Cooperative Collectives

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The authors examined questions about diffusion of responsibility in groups by asking group members to apportion responsibility for an outcome to each group member: Does responsibility diffuse more as groups increase in size but eventually level off in larger groups? Does responsibility diffuse equally, with each member getting an equal portion, or is it concentrated on certain individuals? Do group members apportion responsibility in ways that maximize their own self-esteem? Dyads attributed more responsibility to others after failure than success, but four-person groups tended to take the blame for failure. Overall, however, responsibility diffused in proportion to group size as group members concentrated more responsibility on some group members and withheld responsibility from others through specific role allocations. There was a significant degree of consensus in group members' perceptions of individual members' contributions to performance, but members generally felt they contributed more to the group than did other members.

When people join a group they feel less responsible for their actions than they do when they are alone. This concept of diffusion of responsibility was first proposed by Darley and Latané (1968) as one reason why groups of bystanders, relative to isolated onlookers, are less likely to help someone in need. In groups, the "pressures to intervene do not focus on any one of the observers; instead, the responsibility for intervention is shared among all the onlookers and is not unique to any one" (Darley & Latané, 1968, p. 378). This diffusion process also has been identified as a possible mediator of a number of other group-level phenomena, including polarization (Lamm & Myers, 1978), deindividuation (Zimbardo, 1969), social loafing (Latané, 1981), reactions to resource dilemmas (Fleishman, 1980), competition in larger groups (Komorita & Parks, 1994), and even moral disengagement (Bandura, 1999). For example, when Mynatt and Sherman (1975) compared individuals' and groups' decisions, they found that members of groups made riskier choices and felt less responsible for the negative consequences that ensued. Rogers and Prentice-Dunn (1981) discovered that deindividuation, in addition to reducing self-awareness, also generated feelings of shared responsibility for outcomes. Similarly, Williams, Harkins, and Latané's (1981) studies of social loafing in groups indicated that participants reported feeling less responsible when working in a group than when working alone. Ironically, the group members overestimated their effort and productivity but underestimated their responsibility.

Even though the concept of responsibility diffusion has a venerable history in social psychology—particularly as an explanation of group phenomena—certain puzzles remain about the process. First, when responsibility diffuses in a group, does this diffusion follow a pattern similar to that seen in some studies of conformity, social influence, and social impact: a reduction in personal responsibility as groups increase in size but an eventual leveling off in larger groups? Second, where does responsibility go when it diffuses in the group? Does it diffuse equally, with each member getting an equal portion, or is it concentrated on certain individuals? Last,

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why does responsibility diffuse? Do group members rationally calculate responsibility by estimating others' contributions to the group effort? Or is responsibility diffusion influenced by motivational factors, such as members' desire to apportion responsibility in ways that maximize their own self-esteem? We examine these questions below before reporting an experimental analysis of responsibility allocation in groups that vary in size from two to eight members.

PATTERNS OF DIFFUSION OF RESPONSIBILITY

Studies of conformity have identified at least two distinctive pattern of influence in groups of varying sizes. Asch (1955), for example, discovered that few people conformed when they confronted one or two other people who disagreed with them but that conformity rates increased when one person faced a majority of three. Asch also reported evidence of a ceiling effect in influence rates, because adding even more people beyond three generated only slight increases in conformity. Milgram, Bickman, and Berkowitz (1969), in contrast, report a linear relationship between influence and group size in their study of people's reactions to a group gathered in a public place: the more people in the group, the greater the group's influence.

These findings have stimulated the development of a number of theoretical models of social influence in small groups. These models, although originally developed to explain influence and conformity, nonetheless offer predictions about how responsibility diffuses in groups of varying sizes. Latané's (1981) Social Impact Theory (SIT), for example, suggests that (a) the largest drop in responsibility will occur when a second person joins a lone individual and (b) each additional person will stimulate additional diffusion, but the impact will decrease as the group grows larger and larger. Latané's psychosocial law of social impact, $I = sN^t$, applied to responsibility diffusion predicts that the amount of diffusion (I) will equal the impact of a single person on feelings of responsibility (s) multiplied by the number of other people in the group (N), raised to a certain power (t).

SIT's predictions match, in many respects, predictions derived from Mullen's (1983) Other/Total Ratio (OTR) model. Mullen's OTR agrees that the greatest drop in responsibility will occur at the transition from isolation to group membership because influence depends on the ratio of the number of other people in the majority (O) to the number of people in the minority (S), or OTR = O / (O + S). Mullen's model, when used to predict responsibility, suggests that responsibility will diffuse in proportion to group size; members of two-person groups will accept half, or 50%, of the responsibility for the group's performance, whereas those in four-person groups will accept one quarter, or 25%, and so on.

This prediction diverges, to a degree, from Tanford and Penrod's (1984) social influence model (SIM). SIM suggests that few people conform when one other person disagrees with them but that conformity rises rapidly when a single person faces a group of three or more. The ceiling effect occurs after that point, with the result that increasing the number of people does not increase the group's influence. SIM, applied to responsibility diffusion, implies that members of dyads will diffuse less responsibility than that predicted by OTR or SIT but that members of larger groups will diffuse responsibility at relatively equal rates.

CONCENTRATION OF RESPONSIBILITY

When Darley and Latané (1968) labeled the reduction of responsibility that occurs in groups "diffusion," they were likening the process to the dispersion of gases moving from areas of higher concentration to areas of lower concentration. In an enclosed space, the random motion of a gas's molecules causes it to mix with other gases present until it is dispersed evenly throughout the space. But in ordinary circumstances, gases diffuse unevenly, depending on such situational factors as air currents, temperature, and volume of other gases.

Responsibility, too, may diffuse unevenly throughout a group, with more being apportioned to group members who occupy more central positions in the group, who have special expertise, or who take a more active role in the group's activities (Leary & Forsyth, 1987). Zander (1971), for example, arranged for boys to work in threes, creating designs with dominos. The group members performed essentially equivalent behaviors but the boy who placed the first domino in the design felt more responsible for the group's performance. Similarly, Pepitone (1952) found that group members who thought they had been assigned important tasks reported feeling more responsible for the group's performance and also produced more in that condition. In studies of helping, bystanders are less likely to get involved if they think someone with special training is also witnessing the emergency, and those with special expertise or knowledge are more likely to take responsibility for helping (Schwartz & Clausen, 1970).

These studies, taken together, suggest that one's role within the group influences how much responsibility one takes relative to others and also how much responsibility one is given by others. The leadership role in a group, for example, is often infused with responsibility: Group leaders generally take more credit for their group's products than do rank-and-file members, and in some cases, members agree with their leaders' responsibility claims (Caine & Schlenker, 1979; Meindl, Ehrlich, & Dukerich, 1985). These findings also suggest that in groups with relatively formalized structures, members'

perceptions of responsibility allocations should be consensual; members should show some agreement in their estimates of each members' responsibility (Conway & Schaller, 1998).

EGOCENTRIC TENDENCIES IN RESPONSIBILITY ALLOCATION

Leary and Forsyth (1987), in their review of studies of group members' feelings of responsibility for collective endeavors, identified a pervasive difference between reactions after group success and reactions after group failure. Paralleling results obtained in individual performance settings, group members often display a self-serving, or egocentric, bias: They claim personal responsibility for group success but disclaim responsibility for group failures. But in other cases, group members display a group-serving, or sociocentric, bias as group members emphasize the group's responsibility after success and the group's blamelessness after failure (Forsyth, Berger, & Mitchell, 1981).

Self-serving, egocentric tendencies have been documented in ad hoc laboratory groups, work groups in organizational settings, and teams playing competitions. When the members of such groups were asked to identify or discuss the cause of a positive or negative group outcome, members of successful groups took more personal responsibility for the group's performance than they gave to other group members after a success, but members took less responsibility than they gave others after failure (see Leary & Forsyth, 1987, for a review). Wolosin, Sherman, and Till (1973), for example, had group members divide 100 responsibility points up among three sources: themselves, their partner, and the situation. People who succeeded gave themselves 39 points and their partner 33 points. After failure, the partner got 37 points and they gave themselves 33 points. Similarly, students who worked closely with a professor on a successfully completed joint project gave on average more than 80% of the credit to themselves rather than their mentor (Ross & Sicoly, 1979), and subordinates blamed negative performance appraisals on their boss or external factors but credited themselves for positive reviews (Giola & Sims, 1985).

This self-serving, egocentric tendency is offset, however, by a group-serving, sociocentric tendency that occurs when members of a successful group credit the entire group with responsibility for the outcome and members of a failure group protect the group from blame by denying its responsibility (Forsyth & Schlenker, 1977; Rantilla, 2000; Schlenker & Miller, 1977). Norvell and Forsyth (1984), for example, after telling groups they performed well or badly, content analyzed the groups' subsequent discussion to identify admissions or claims of responsibility (concessions), denials of responsibility (excuses, justification), and challenges to the validity of the feedback (refusals). Groups were primarily group serving, with members emphasizing the entire group's responsibility after success and the group's blamelessness after failure.

These findings suggest that the diffusion of responsibility is a partly motivated process rather than a strictly logical one. Paralleling analyses of individuals' reactions to their personal successes and failures, a motivated model of responsibility diffusion assumes that individuals' need to view themselves positively distorts their interpretation of their responsibility for good and bad outcomes. By taking credit for a group's successes, members can increase their feelings of self-worth by thinking "me" (Leary & Forsyth, 1987). Moreover, because a portion of self-esteem is tied to one's group memberships, group members' sense of self-worth prospers when their groups are credited with the successes but not blamed for their failures (Dietz-Uhler & Murell, 1998).

THE PRESENT STUDY

We examined responsibility diffusion in cooperative collectives by creating two-, four-, six-, and eight-member groups in a laboratory setting. Following procedures used in much of the prior work on responsibility allocation in groups, the groups worked on a problem that can be classified as additive and compensatory in Steiner's (1972) taxonomy of group tasks. This setting parallels the structure of the tasks that many naturally occurring groups face, where individual contributions are combined to yield a group product but any specific individual rarely ensures victory or dooms the group to failure. After receiving positive or negative feedback about their group's performance, participants rated each members' responsibility and contributions to the group.

We expected that responsibility would diffuse in groups, depending on the group's size and the quality of its performance. First, drawing on Mullen's (1983) OTR model of social influence, we predicted members of two-, four-, six-, and eight-person groups would accept 50%, 25%, 16.6%, and 12.5% of the responsibility, respectively. Alternative patterns, such as Latané's (1981) SIT, also were tested.

Second, we predicted that the valence of the group's outcome would influence diffusion. Members of groups tend to limit their personal responsibility for failed group endeavors and increase their responsibility for successes; therefore, we predicted that diffusion of responsibility would be more pronounced after failure and that the ambiguity of blame that characterizes larger groups would exacerbate this tendency.

Third, we also examined the processes that sustained these allocations of responsibility. Drawing on the literature discussed above, we predicted responsibility would,

in most cases, be diffused unevenly across group members such that (a) members would tend to allocate extra responsibility to one or more specific group members and withhold responsibility from others, (b) individuals who claimed to occupy more central roles in the group also would claim to be more responsible for the group's outcomes, and (c) fewer individuals would claim leadership roles in groups that failed.

Last, we also investigated the degree to which members of the same group agreed with one another when evaluating each member's contribution to the group effort by applying Kenny's (1994) social relations model (SRM) to portions of the data (Kenny, Kashy, & Bolger, 1998). A number of studies have used the SRM to study group members' perceptions of each other (e.g., Boldry & Kashy, 1999; Malloy, Albright, Kenny, Agatstein, & Winquist, 1997; Marcus & Kashy, 1995). Malloy et al. (1997), for example, use the model to estimate consensus in groups, which they defined as the extent to which members agree in their ratings of a common target. SRM, by using a reciprocal design in which group members rate all group members (including themselves), makes it possible to distinguish between each members' unique perception of all group members (perceiver variance); the degree of consensus among all group members when evaluating a specific group member (target variance); and unique, dyadic-level variance that reflects one group members' unique perception of another group member. Because participants in our study rated the contribution of every member to the group, Kenny's SRM provides both a theoretical and statistical model for identifying the extent to which a group member's perceptions of responsibility were unique, widely shared by other group members, or a reflection of specific dyadic relationship between the perceiver and another group member. We predicted, in keeping with prior findings pertaining to trait ratings, a significant level of consensus among group members in their impressions of each member's responsibility for their groups' performance.

METHOD

Participants

A total of 61 women and 61 men recruited from undergraduate psychology classes participated in the hour-long sessions, with approximately equal numbers of men and women randomly assigned to each cell of the 2 (performance: success or failure) × 4 (group size: two, four, six, and eight) factorial design. The sessions were conducted by one of five experimenters (two men and three women) who conducted nearly equal numbers of sessions across the performance manipulation. Due to limitations in the number of available participants, only two of the experimenters ran groups of six and eight participants. The researcher explained that the study concerned groups that "had no history as a group"; therefore, any participants who reported knowing one another were dismissed and replaced with additional participants. The group members were all same-sex for all sessions. All participants, before leaving the laboratory, were thoroughly debriefed.

Procedure

Participants initially sat at individual work stations separated by partitions. The experimenter explained that the study, as an investigation of "the intellectual performance of groups," measured intelligence and creativity with a test designed for groups rather than individuals. He or she explained that after completing the test, the group's Group Ability Quotient (GAQ) would be calculated and compared to other groups' GAQs. Participants were told that only those groups that performed well would become eligible to participate in a $50 raffle to be held when the study was completed. All participants agreed to take part by signing an informed consent statement. They then clipped an identification letter to their shirt or dress and the experimenter referred to them by that letter for the remainder of the study (A and B in dyads; A, B, C, and D in quadruplets; etc.).

The experimenter indicated that the Group Ability Test included analogy, vocabulary, mechanical aptitude, and decision-making items drawn from a well-known intelligence test. Participants were told that performance on the test would be determined by many factors, including level of intelligence, educational background, and ability to think clearly. They then completed nine multiple-choice items individually and one decision-making item in a face-to-face group discussion. The multiple-choice items were taken from Forsyth and Kelley (1994), who wrote them so that the participants could not determine their own level of performance subjectively. Examples include, "Seek is to Find as Hear is to (a) listen, (b) know, (c) understand" and "These new rules __ the old ones," with alternatives of *supersede*, *supplant*, and *replace*. The items were numbered nonconsecutively (e.g., 11, 28, 38) and participants were told that items from the test were scattered around various group members, who answered without consulting one another. In addition, participants were informed that the overall group score on this task was calculated using only correct answers and that items varied in point value.

When participants completed the multiple choice items, they moved to a single large table in the center of the room. The experimenter explained that the final item on the Group Ability Test assessed the group's ability to communicate effectively, think creatively, and efficiently evaluate a number of possible solutions before finding the best answer. Participants were then given sev-

eral slips of paper containing information about a murder mystery and were told that the group was to answer the mystery by discussing these clues. Members could read the clues aloud but were instructed not to pass them between group members. Members also were told to always refer to one another using their assigned letters rather than by name. This task (Forsyth, 1999, Exercise 11-2, "Decision-Making in Groups"), promotes interaction among members but at a relatively equal rate because all members have the same number of clues to share.

Participants were allotted 15 minutes to complete this second task, during which answers to the first task were supposedly scored. The experimenter, after noting the group's solution to the second component, provided information concerning overall group performance on the group intelligence test. Participants randomly assigned to the success condition were told the following:

> Your group did very well and ranks easily in the top 10% of all the groups that we have tested using these tasks. Your Group Ability Quotient was 122, which is quite high. Since your group did so well, please put your names and addresses on these slips so we can put your name in the raffle.

Participants assigned to the failure condition were told the following:

> Your group didn't do well at all. It scored in the lower 20% of all the groups that we have tested using these tasks. Your Group Ability Quotient was 88, which is quite low. I'm sorry but your group did not qualify for the raffle, so don't fill out the slips.

Participants then completed all dependent measures.

Measures

Participants completed an extensive questionnaire at the completion of the study. The questionnaire asked general questions about their experiences in groups and their appraisal of the current group, but specific items about responsibility, contributions, and roles also were embedded in the inventory.

Responsibility points. An ipsative index of responsibility was created by asking participants to allocate 100 points among all the members of the group, giving more points to the more responsible member. To reduce response demand, the questionnaire only listed group members' identification letters. In consequence, respondents indicated their own responsibility by letter rather than by identifying themselves. Percentage of responsibility allocated to oneself and to the others was then calculated by dividing points allocated to self and the others by the total number of responsibility points allocated (usually 100).

Contribution. Participants were given a list of group members, identified only by letter, and asked to give each one a rating from 1 to 5 to indicate the magnitude of their contribution (1 = *not a contributor* and 5 = *large contributor*).

Roles. Group members were given a list of eight possible roles that may have existed in their group: leader, critic, joker, harmonizer, follower, observer, communicator, and participator. They were then told to assign these role labels to each of the group members, with the stipulation that roles could be used many times and that any individual could be assigned multiple roles.

Ancillary items. Participants rated the quality of their group's performance on a 9-point scale that ranged from *very well* to *very poorly.* Participants also responded to three Likert-type items to assess their attraction toward the group: "I liked the other members of the group," "I would be willing to work with this group again in the future," and "There was a feeling of unity and cohesion in my group." All items were answered using a 5-point scale that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). These items were averaged together to yield a total cohesion score. The Cronbach's alpha for the scale was .70.

RESULTS

We examined the impact of group size and performance on responsibility diffusion in a series of 2 (sex) × 2 (performance: success vs. failure) × 4 (group size: 2, 4, 6, and 8) analyses of variance that controlled for unequal cell sizes and missing data by adjusting each effect for those of equal or lower order. We used individuals as the unit of analysis because the small number of groups, particularly in the six- and eight-member conditions, precluded us from using hierarchical linear modeling methods or treating the groups as the unit of analysis (Nezlek & Zyzniewski, 1998). Such an analytic approach is appropriate given the degree of control over the groups' interactions in the laboratory task and the relatively low level of group-level interdependence in participants' data. We tested for this interdependence by calculating intraclass correlations using group as the predictor variable (Kashy & Kenny, 2000; Kenny & Judd, 1996) and responsibility allocations as the dependent variable. Averaging across all the groups, the level of interdependence was not significant, hence supporting the individual-level analysis. Interdependence was lowest and not significant in the two-, six-, and eight-person groups (–.14, –.16, and .05, respectively) but higher in the four-person groups (.21). This positive intraclass correlation suggests that participants in the four-person groups showed more group-

TABLE 1: Diffusion of Responsibility in Two-, Four-, Six-, and Eight-Person Groups: Means, Standard Deviations, *F* ratio, $\eta 2$, and Significance Level for the Main Effect of Group Size

Index	*Group Size* 2	4	6	8	F *Ratio* (η^2)	p *Value*
1. Personal responsibility (% of responsibility to self)	51.84[a] (11.62)	27.63[b] (7.76)	17.80[c] (5.18)	12.97[d] (3.60)	140.33 (.81)	<.0001
2. Other's responsibility (averaged across others)	48.12[a] (0.12)	24.16[b] (0.03)	16.43[c] (0.01)	12.44[d] (0.01)	197.03 (.86)	<.0001
3. Discrepancy between most responsible member and average allocation	0.13[c] (6.35)	3.28[b, c] (3.74)	5.97[a, b] (9.73)	7.12[a] (4.66)	6.71 (.16)	<.0004
4. Discrepancy between least responsible member and average allocation	0.13[a] (6.35)	–4.53[b] (5.37)	–2.22[a, b] (11.36)	–5.28[b] (2.98)	4.19 (.11)	< .008
5. Range in responsibility allocations	—	7.81[b] (7.98)	8.19[b] (6.83)	12.40[a] (6.51)	15.99 (.34)	<.0001
6. Own contribution	4.42[a] (0.83)	4.03[a] (0.67)	4.23[a] (1.23)	3.56[b] (0.84)	4.67 (.11)	<.004
7. Others' contributions (averaged across others)	4.21[a] (1.14)	3.77[b] (0.69)	3.55[b] (0.58)	3.44[b] (0.49)	4.85 (.12)	<.01
8. Highest contributor's rating	4.29[a] (0.85)	4.38[a] (0.55)	4.45[a] (0.67)	4.65[a] (0.48)	1.97 (.05)	0.12
9. Low contributor's rating	4.29[a] (0.85)	3.29[b] (1.00)	2.45[c] (0.80)	2.25[c] (0.84)	27.58 (.43)	<.001
10. Range in contribution ratings	—	1.09[b] (0.90)	2.00[a] (1.02)	2.41[a] (0.87)	43.53 (.27)	<.0001

NOTE: For any one index, means without a common single letter superscript differ at $p < .05$ by Duncan's New Multiple Range Test ($df = 3, 91$ for indices 1 to 5; $df = 3, 96$ for indices 5 to 10). Standard deviations are in parentheses for the group size columns.

level agreement in their ratings of members' responsibility and contribution to the groups.

Perceptions of Performance

When asked "How well did the group-as-a-whole do on the test?" members of groups that failed rated their group's performance more negatively than did members of successful groups, $F(1, 105) = 153.12$, $p < .01$, $\eta^2 = .54$. The means were 4.8 and 8.4, respectively. The only other effect to reach significance on this item was the two-way interaction of performance and sex, $F(1, 105) = 19.26$, $p < .01$, $\eta^2 = .05$. Women in failure groups rated their group's performance more negatively than men whose groups failed; the means were 3.7 and 5.9 ($p < .05$). Women and men in successful groups did not evaluate their groups differently (*M*s = 8.5 and 8.2).

Only the main effect of performance was significant in the analysis of participants' attraction to their group, $F(1, 91) = 23.95$, $p < .0001$, $\eta^2 = .10$. Members of successful groups rated them more positively than members of groups that failed. The means were 4.05 and 3.59, respectively.

Perceptions of Own Responsibility

Group size and responsibility. We measured group members' perceptions of responsibility by asking them to allocate 100 responsibility points to themselves and the other members of the group. These allocations indicated that members felt less responsible as their groups became larger and larger (see Table 1 for summary statistics). Members of two-person groups took, on average, 51.8% of the responsibility for their group's performance; this allocation dropped to 27.6% in the four-person groups, to 17.8% in the six-person groups, and to 13.05 in the eight-person groups. These decreases were all significant (*p*s < .05).

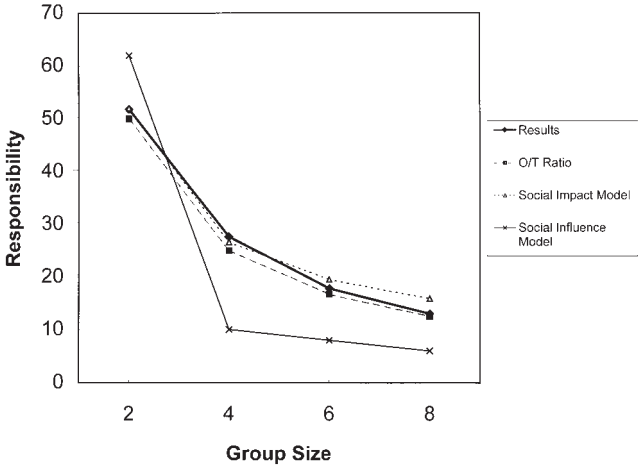

Figure 1 The predicted and obtained relationships between group size and diffusion of responsibility in groups.
NOTE: Social Impact Theory (SIT) = $51.84N$. O / T Ratio = Other / Total Ratio.

Figure 1 compares these results to those predicted by Mullen's (1983) OTR, Latané's (1981) SIT (Impact = $51.84N^{-.61}$), and Tanford and Penrod's (1984) SIM of jury influence. The means track OTR and SIT predictions closely, because the decreases in responsibility were proportional to increases in group size. Responsibility did not level off in the larger groups, but as Latané's model predicts, increases in group size had a decreasing impact on responsibility allocations. Responsibility decreased rapidly in the dyads and four-person groups but only gradually in the six- and eight-person groups.

TABLE 2: The Impact of Performance Feedback and Group Size on Perceptions of Personal and Other Member's Responsibility

Index	*Performance*	*Group Size* 2	4	6	8
1. Personal responsibility	Success	55.66[a] (7.60)	24.95[c] (2.91)	17.78[d] (2.39)	13.56[d] (4.06)
	Failure	49.23[a] (7.60)	32.08[b] (10.97)	17.82[d] (6.81)	12.36[d] (2.98)
2. Deviation from OTR	Success	4.66[a, b] (14.67)	–0.06[b] (2.91)	1.11[a, b] (2.39)	1.00[a, b] (4.08)
	Failure	–0.77[b] (7.69)	7.08[a] (10.97)	2.39[a, b] (6.81)	–0.14[b] (2.98)
3. Other member's responsibility	Success	45.25[b] (14.95)	25.07[c] (1.03)	16.47[d] (0.43)	12.35[d] (0.58)
	Failure	50.77[a] (7.60)	22.64[c] (3.65)	16.40[d] (1.35)	12.53[d] (0.44)

NOTE: For any one index, means without a common single letter superscript differ at $p < .05$ by Duncan's New Multiple Range Test ($df = 3, 91$). OTR = Other / Total Ratio model.

Group performance and responsibility. The findings presented in Figure 1 were qualified, in part, by a significant interaction of performance and group size, $F(3, 91) = 4.07$, $p < .05$, $\eta^2 = .02$. As shown in Figure 2, only the dyad members tended toward egocentrism in their allocations of responsibility; they took on average 54.6% of the responsibility for success and 49.2% of the responsibility for failure, $F(1, 91) = 3.41$, $p < .07$. The four-person groups revealed a sociocentric pattern, such that members took more responsibility for a failure (32.0%) than for a success (24.9%). These differences also emerged when we calculated deviation scores by subtracting the estimate of responsibility predicted by OTR from respondents' own responsibility estimates. The means for the significant interaction of performance and group, $F(3, 91) = 3.75$, $p < .05$, $\eta^2 = 01$, shown in Table 2, indicate that members of dyads that succeeded and four-person groups that failed claimed more responsibility than what OTR predicts (*p*s < .05). None of the other deviations were significant.

Perceptions of Other's Responsibility

Group size and others' responsibility. Group members's allocations of responsibility to other group members were also proportional to group size. As Table 1 indicates, members of two-person groups allocated, on average, 48.1% of the responsibility for their group's performance to their partner; this allocation dropped to 24.2% in the four-person groups, to 16.4% in the six-person groups, and to 12.4% in the eight-person groups. These decreases were all significant (*p*s < .05). No other effects were significant, including the interaction of group size and performance, $F(3, 91) = 2.56$, $p = .06$, *ns*. The pattern of the means, however, mirrored the findings reported for personal responsibility, with members of dyads giving more responsibility to their partner after a failure rather than a success (*M*s = 50.8 and 45.3), members of four-person groups giving more responsibility to other group members after a success than a failure (*M*s = 25.1 and 22.6), and no differences due to performance in both the six- and eight-person groups.

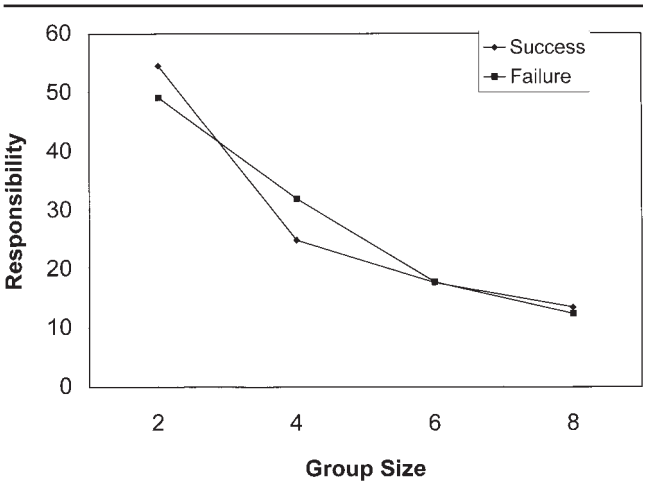

Figure 2 The impact of group performance on diffusion of responsibility in two-, four-, six-, and eight-person groups.

Patterns of responsibility diffusion. We generated three different indexes to test for variations in responsibility allocations across group members. First, by identifying the amount of responsibility allocated to the most responsible group member and then subtracting the mean of the participants' responsibility allocations to the other group members from this amount, we could calculate the discrepancy between the average members' responsibility and the most responsible member. Second, we identified the least responsibility allocated to any group member by subtracting the mean of the participant's responsibility allocations to all other group members from the amount of responsibility they allocated to the individual given the least responsibility. Third, we calculated the range in responsibility allocations across all the group members (excluding allocations to the self).

The significant main effect of group size for all three of these indexes generally indicates that the responsibility allocations varied more as groups became larger in size (the *M*s and *F* ratios are inventoried in Table 1). The group member who was thought to be the most responsi-

ble was given, on average, more than three additional points of responsibility in four-person groups, nearly six extra points in six-person groups, and more than seven extra points in eight-person groups. The group member who was thought to be the least responsible was given fewer points in the four-person groups than in the six-person groups (four fewer vs. two fewer), but the most extreme withholding of responsibility occurred in the eight-person group, where an average of 5.3 fewer points were given to the individual who was seen as the least responsible. Hence, and as Table 1 indicates, the range in responsibility scores increased as group size increased. No other main effects or interactions were significant for these indexes.

Perceptions of Contribution to the Group

Group size and own contribution. We also measured group members' perceptions of responsibility by asking them to rate each members' contribution to the collective effort on a scale from 1 (*not a contributor*) to 5 (*large contributor*). As the means in Table 1 show, group members felt they contributed less as their groups grew in size, but the only statistically significant decline occurred in the eight-person groups. A main effect of sex was the only other effect that reached significance on this item, $F(1, 96) = 6.44$, $p < .01$, $\eta^2 = 05$. Men rated their contributions as more substantial than did women; the means were 4.2 and 3.8, respectively.

Group size and others' contributions. The only effect to reach significance in the analysis of the averaged ratings of others' contributions to the group was a main effect of group size tabled in Table 1. Participants felt that other group members contributed less in groups with more than two members.

Table 1 also displays the means and *F* ratios for the significant main effect of group size for participants' perceptions of the group member who contributed the most, the group member who contributed the least, and the perceived range of contribution across all group members. As with responsibility judgments, participants in larger groups reported more disparate levels of contribution than did members of smaller groups. The range of perceived contribution was greater in six- and eight-person groups than in four-person groups. Members of larger groups rated the contribution of the person who did the least for their group as less substantial than did the members of smaller groups. Members of larger groups also tended to rate the contribution of the person who did the most for their group as more substantial than did the members of smaller groups, although this effect was not statistically significant.

The main effect of group performance was the only other effect that reached significance for these items, and it emerged only on ratings of the lowest and highest contributor. Members of failure groups rated the contribution of the person who did the most for their group as less substantial than did the members of successful groups, $F(1, 96) = 5.32$, $p < .05$, $\eta^2 = 05$. The means were 4.3 and 4.6, respectively. Members of failure groups also rated the contribution of the person who did the least for their group as less substantial than did the members of successful groups, $F(1, 96) = 4.18$, $p < .05$, $\eta^2 = 02$. The respective means were 2.8 and 3.2.

Consensus. The responsibility and contribution ratings were collected using a reciprocal, round-robin design: Each member rated each members' contribution to the group. For the contribution measure, however, each group member rated each other group member's contribution independently of other members' contributions; rather than dividing up 100 points, members rated each other's contributions on a scale from 1 to 5. The structure of these data allowed us to examine them using the SOREMO statistical program developed by Kenny (1998) for use in testing the social relations model. This program decomposes variance in ratings from groups consisting of at least four members into four components: constant, perceiver, target, and relationship. The constant reflects the average level of responsibility allocated across all targets and perceivers. The perceiver component indexes the extent to which group members view others similarly when allocating responsibility. The target component indexes the extent to which a specific group member is seen as similarly responsible by all other group members. The relationship component reflects dyadic-level variance in the data (the amount of responsibility each group member attributes to a each other member of the group) after controlling for perceiver and target effects.

Data from the four-, six-, and eight-person groups ($n = 17$) were analyzed with SOREMO. The variance is partitioned separately for each group, and those results are averaged across the groups (Marcus, 1998). The SOREMO analysis first indicated that, at the group level, individuals rated their own contributions to the groups' performance significantly higher ($M = 3.92$) than their ratings of other's contributions ($M = 3.60$), $t(16) = 3.26$, $p < .01$. This *t* test assesses whether each variance component differs from zero; a significant finding indicates stable individual differences among participants. SRM decomposition revealed significant variance for both perceiver and target effects. The proportion of variance in contribution ratings for the perceiver was 19.7%, providing evidence for assimilation in the perception of contributions made by group members. Target accounted for 22.4% of the variance, suggesting agreement in group members' contribution ratings for particular group members. Both of these estimates are consistent with the respective percentages of variance

accounted for in other studies employing SRM analyses (e.g., Malloy et al., 1997; Marcus, 1998). Relationship / error accounted for 57.9% of the contribution variance, which suggests that people have unique perceptions of each others' contributions to the group's performance. It is important to note that it is not possible to separate error from relationship variance with the present data, because contribution was a single item construct.

Roles and Responsibility

After allocating responsibility and rating each member's contribution, respondents also assigned one of eight role labels to each member. They were told they could assign as many labels as they wanted to any particular member, but the following analysis only considers the first role given to each group member.

Role selections. Participants tended to describe themselves as occupying either the leader role or one of the active member roles in their groups, $\chi 2(7, N = 106) = 70.45$, $p < .01$. Of those members who selected a role, 17.0% picked the leader role, 16.0% the harmonizer role, and 61.9% selected one of the general member roles; either active communicator (33.0%) or participator (28.9%). The remaining participants believed they occupied the critic (0.9%), joker (6.6%), uninterested follower (.9%), and observer (6.6%) roles. Because of the small frequencies of some of these role categories, we collapsed the role selections into four categories: leader, member, harmonizer, and other.

A 2 (performance) × 4 (group size) log-linear analysis of participant's own role selections revealed only a significant effect of group size, $\chi^2(9, N = 105) = 25.26$, $p < .01$. Most of the members of dyads (81.8%) and four-person groups (84.4%) selected either the leader or member roles; the χ^2s were 10.73 and 33.75, respectively (dfs = 3, ps < .01, Ns = 22, 32). In contrast, the members of six-person and eight-person groups were more evenly distributed throughout the four roles, with two exceptions. First, no member of an eight-person group named himself or herself as the leader of the group, $\chi^2(3, N = 30) = 8.87$, $p < .05$. Second, members of eight-person groups were more likely to select one of the more marginal roles (critic, joker, uninterested follower, or observer) for themselves, $\chi^2(3, N = 30) = 14.60$, $p < .01$. Only 15 participants in the study selected one of these roles, but of those 15, 10 were members of eight-person groups.

Allocation of roles to other group members. Participants assigned a total of 442 role ascriptions to their fellow group members. The majority of these assignments, similar to members' own role selections, fell into either the leader role or one of the active member roles, $\chi(7, N = 442) = 266.99$, $p < .01$. These role ascriptions indicated that 11.9% of the group members were assigned to the leader role, 12.2% were assigned to the harmonizer role, 58.6% to the general member role, and 17.3% to one of the critic (2.9%), joker (4.1%), uninterested follower (3.4%), and observer (9.7%) roles. As with own-role assignments, we collapsed the role selections into four categories—leader, member, harmonizer, and other—but no effects reached significant in a 2 (performance) × 4 (group size) log-linear analysis of these role allocations.

Leadership and responsibility. Given the significant tendency for participants to avoid naming themselves as the leader in the eight-person group, we carried out a secondary analysis of only this role and its relationship to responsibility diffusion. First, analysis of the frequencies indicated that very few members of dyads assigned the leadership role to their partner, $\chi 2(3, N = 30) = 15.13$, $p < .01$. The leadership role was ascribed by only 2 of the 30 members of dyads (6.7%) in comparison to 44.6% of the 92 participants in the larger groups. Second, the 42 group members who identified someone other than themselves as their group leader took significantly less responsibility for the group's outcome, $F(1, 105) = 15.26$, $p < .001$, $\eta 2 = 13$. Participants who did not assign anyone to the leader role in their group took, on average, 31.78% of the responsibility for the performance, whereas those who did assign a fellow group member to this role took only 19.59% of the responsibility. A similar relationship was found in our analysis of perceived contribution to the group endeavor. Participants who did not assign the leader role to another group member rated their contribution significantly higher than participants who did, $F(1, 110) = 7.59$, $p < .01$, $\eta 2 = 06$. The means were 4.20 and 3.71, respectively. Last, group members who assigned themselves to the leader role took more responsibility than those who did not, but only when their group failed. A 2 (assigned self to leader role vs. did not assign self to leader role) × 2 (performance) × 4 (group size) ANOVA on personal responsibility revealed the significant main effect of group size discussed earlier but also an interaction of leadership and performance, $F(1, 91) = 4.38$, $p < .05$, $\eta 2 = .01$. In the successful groups, participants who selected the leader role for themselves took no more responsibility than individuals who did not take the leader role. The means were 32.6% and 28.3%. However, in failure groups, individuals who selected the leader role for themselves took significantly more personal responsibility than did group members who did not consider themselves to be the group's leader ($p < .05$). The mean percentages were 42.0% and 24.0%, respectively.

DISCUSSION

Does responsibility diffuse in groups? We examined this question by creating groups of varying size in a labo-

ratory setting and asking their members to describe how responsible they felt for their group's performance. Their responses confirmed Darley and Latané's (1968) original prediction, because responsibility decreased in proportion to the size of the group. In the groups that we studied, however, responsibility did not diffuse equally across the members. First, a social relations analysis indicated members overrated their own personal contributions. Second, members identified individuals in their groups who they viewed as more responsible than the others and members who were less responsible than the others. This variability in responsibility diffusion increased as the groups increased in size, reaching a maximum in eight-person groups where the most responsible member received, on average, more than 12% more responsibility than the least responsible member.

Diffusion was also connected to role assignments within these laboratory groups. People who felt someone else in the group filled the role of the leader took less responsibility for the group's performance than did participants who did not assign anyone to the leader role. This impact of role was due, in part, to dyad members' unwillingness to share leadership. Fewer members of two-person groups assigned the role of leader to their partner, and these members also claimed more responsibility than members of other groups. Fewer members of eight-person groups, in contrast, named themselves as their group's leader. Responsibility diffused in large groups as members stepped into more peripheral roles and avoided more central leadership roles.

These decreases in responsibility are consistent with Mullen's (1983) Other / Total Ratio and Latané's (1981) SIT. Mullen argues that certain processes, such as social influence and self-awareness, rise and fall in strength depending on the ratio between the size of an individual member's subgroup and the size of the larger groups to which they belong. Latané's SIT similarly suggests that the impact of other people on individuals depends on their strength, number, and proximity but "that impact will increase in proportion to some root of the number of people present" (Latané, 1981, p. 344). When we used a negative power function to fit Latané's $I = sN^t$ to the data, we found that the model underestimated the amount of responsibility diffusion in the six- and eight-person groups, but the discrepancy was trivial.

Did responsibility diffuse differently in successful groups than in failure groups? We predicted a steeper diffusion curve in failure groups than successful groups but did not confirm these predictions. Instead, responsibility allocations were influenced by outcome only in the dyads and quadruplets. Egocentric biases were strongest in dyads, because members of two-person groups gave less responsibility to their partner after their group succeeded and so claimed slightly more personal responsibility for themselves. Dyad members did not blame failure on their partner, because the egocentrism in dyads was more a case of responsibility acquisition after success rather than responsibility denial after failure. In contrast, sociocentric biases were strongest in quadruplets. Members of four-person groups did not take more than their share of the credit after success, but they did take more of the blame for failure. Their sociocentrism was more a case of blame-taking than modesty. The responsibility allocations of those in the larger groups were not influenced by the group's outcomes.

We hoped that internal analyses of group members' perceptions of their groups would explain these different tendencies, but we could not identify any substantive differences between the dyads, quads, and larger groups on the limited measures we collected in these groups. The members reported that they liked the other group members more and that their group was more cohesive after a success than failure, but these ratings were not influenced by group size; the quads were no more cohesive than the dyads. We did not, however, assess level of competitiveness within the group; therefore, it is possible that members of dyads felt as if they were competing with one another. This explanation is consistent with the role data, because members of dyads preferred to claim the leader role for themselves rather than assign it to their partner, but additional research is needed to explain the pattern of results we obtained in the current study.

Our inability to identify the factors that mediated the patterns of responsibility allocations we documented is but one of the limitations of the current research. A second serious limitation of the investigation concerns the nature of the situation we created in these ad hoc groups. Although the concept of diffusion of responsibility was initially proposed in studies of spontaneously forming groups of bystanders witnessing an event, we studied temporary groups working in a laboratory setting. Although we documented diffusion in these groups, the variations found among members may reflect the characteristics of the task they completed. We deliberately tried to create a group task that required participation by all members and included both individual and collective work. Such a task is analogous to tasks completed by bona fide groups (e.g., assembly teams, professional work groups, sports teams), but this structure may have so constrained participants that their responsibility allocations were less biased than they might be otherwise. Future research must identify the relationships between the type of task the group completes—and in particular, the way the task constrains the way group members' individual contributions are com-

bined—and responsibility allocations. Patterns other than the ones we obtained would likely emerge when groups work on tasks where one member can monopolize the group's discussions, when members can withdraw from the group through nonattendance or inattention, or a strong leader is appointed to take charge of the group.

Our findings also may reflect the method we chose for assessing responsibility allocations. We sought to minimize social desirability biases by making the questionnaire anonymous and asking participants to assign responsibility to group members by letter. Group members were not asked, "How responsible are you?" but instead were asked to assign responsibility to person A, B, and so on. We hoped that these procedures would free participants to report their actual feelings of responsibility, but their obtrusiveness also may have prompted them to allocate responsibility equally across the group members. The procedures also may have prompted participants to think more about responsibility for performance than they normally do. Prior analyses of this issue (e.g., Samuelson, 1987; Weiner, 1985) suggest that individuals spontaneously search for the causes of the personal performances, but relatively few studies have examined naturally occurring responsibility allocations in intact groups (Norvell & Forsyth, 1984; Rantilla, 2000).

Despite these limitations, the current findings are largely consistent with Darley and Latané's concept of responsibility diffusion (Darley & Latané, 1968). This social process, however, is more complicated than its original conceptualization suggested. Just as a gas' diffusion is influenced by a range of factors, so a number of factors likely influence diffusion of responsibility in groups. The current study only considered group size and role in the group, but other variables such as identifiability of members' inputs, group norms pertaining to resource allocation, and the nature of the task should be examined in future work. The tension between egocentric and sociocentric allocations also requires more study, because the current study's null findings pertaining to cohesiveness as a mediating factor are not at all conclusive. If these biases are linked to self-esteem, as past work suggests (e.g., Dietz-Uhler & Murrell, 1998), then the magnitude of these tendencies should vary depending on the unity of the group, the members' identification with their group, and the importance of the task to the individual. More research also is needed to connect responsibility allocation processes to other group processes, including group formation, performance, and conflict. Group members may be reluctant to join groups if they feel they will get little credit for their personal contributions, and they may leave groups when they are blamed for their group's failures (Shaw & Tremble, 1971). In terms of performance, if individuals make self-serving attributions that lay the blame on other group members, the group may experience discord and the true source of the problem may remain unexcised. The current study suggests that disputes over responsibility for outcomes are most likely in smaller groups, but this speculative conclusion requires confirmation in groups working in situations where individual members' contributions are unregulated and the consequences of poor performance are serious.

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