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Did I do that? Group positioning and asymmetry in attributional bias

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Abstract

A laboratory experiment examined whether one structural feature of groups – members' physical positioning – may produce asymmetry in their perceived contribution to a task. In particular, we investigated asymmetry in group members' (often excessive) claims of credit for collective tasks ("the self-serving attributional bias"). Consistent with the availability account of this bias, group members located in the middle of a group, with easy visual access to their partners' contributions, demonstrated less bias than outside members (who demonstrated bias consistent with prior research) – but no less satisfaction. Further analyses suggested that these results reflected bias reduction among middle members, and did stem from visual availability. We conclude that the visual constraints imposed by physical positioning influence the availability of information and thus generate asymmetric attributional bias – with implications for conflict and its reduction.

Key words**:** Asymmetry, self-serving attributional bias, group positioning, group performance, conflict

Introduction

Envision three researchers, seated in a row, proposing new study ideas. If the researchers and their participants behave alike, then each person may come to believe that their contribution to the idea generation process was considerable (Ross & Sicoly, 1979). To the extent that each claims credit, this conclusion, natural in groups (Bazerman & Neale, 1982; Neale & Bazerman, 1983; Thompson & Loewenstein, 1992), may generate dissatisfaction with the whole experience (Caruso, Epley, & Bazerman, 2006). This dissatisfaction, in turn, may discourage the researchers from working together in the future.

Although many factors contribute to successful group work, this thought experiment illustrates the harm that the self-serving attributional bias (defined as assigning more credit to the self, especially for positive outcomes, than is objectively-due) (Bradley, 1978; Miller & Ross, 1975; M. Ross & Sicoly, 1979) can cause in groups. It also highlights an important structural variable in all groups: their members' physical positioning ("seated in a row"). Our paper examines the possibility that perceived contributions and subsequent dissatisfaction may depend on the way that the three researchers were seated. Specifically, we examine whether those who could see their colleagues' contributions better (i.e., middle members) could appreciate them better—and would then feel better when their colleagues claimed credit. In other words, we investigate whether group members located in different places display asymmetric levels of bias, as a function of visual availability.

Researchers have identified the self-serving attributional bias as an important source of dissatisfaction and conflict in negotiations (Babcock & Loewenstein, 1997; Babcock,

Loewenstein, Issacharoff, & Camerer, 1995; Loewenstein, Issacharoff, Camerer, & Babcock, 1993; Thompson & Loewenstein, 1992; Wade-Benzoni, Tenbrunsel, & Bazerman, 1996), and work groups (Caruso, et al., 2006; Corgnet, 2010; Epley, Caruso, & Bazerman, 2006). In both contexts, egocentric interpretations lead individuals, regardless of their actual contributions, to claim a larger share of the credit than warranted. As a result, group members often disagree on the allocation of the joint outcome. Promoting effective groups and minimizing group conflict thus require mitigating the self-serving attributional bias (hereafter called "attributional bias") of individual members. We conjectured that physical positioning might do that.

Although researchers have documented the attributional bias for several decades (Bradley, 1978; Mezulis, et al., 2004; Miller & Ross, 1975; Mullen & Riordan, 1988; Roese & Olson, 1993; M. Ross & Sicoly, 1979; Zuckerman, 1979), investigations of how to mitigate it (Caruso, et al., 2006; Epley, et al., 2006) have only come to the fore more recently. Recent investigations focus on the cognitive bases of the bias; they tend to recommend that group members actively attend to one another's contributions. Whereas actively focusing on one's own contribution exacerbates egocentric judgments and behaviors (Burger & Rodman, 1983; M. Ross & Sicoly, 1979), actively focusing on others' contributions reduces attributional bias (Savitsky, Van Boven, Epley, & Wight, 2005).

However, these studies (Caruso, et al., 2006; Epley, et al., 2006) stress that asking group members to focus on others' contributions may carry a pernicious side-effect: genuine contributors, actively focusing on others' negligible contributions, increasingly lose satisfaction with the group and interest in future collaboration. Thus, although an active focus on others does reduce attributional bias, it does not reduce the attendant dissatisfaction. Indeed, this solution is

limited by generating more of the dissatisfaction it was intended to reduce (e.g., Caruso et al., 2006).

Accordingly, we sought to document not only the existence of asymmetric attributional bias, as a function of physical positioning, but any effects of asymmetry on satisfaction. If the asymmetry reflected bias reduction, for example, we sought to determine whether that reduction generated comparable dissatisfaction. Since physical positioning is a structural variable, we expected it to operate at a relatively unconscious level (Nisbett & Wilson, 1977; L. Ross & Nisbett, 1991) – at least compared to the "focus on others" approach above. Thus, we expected any observed asymmetries to come without the changes in satisfaction characteristic of conscious comparisons. If so, and if the asymmetries reflected bias reduction, so much the better: at least for middle group members, we thought they would.

In sum, we set out to examine whether: 1) simple, structural variables in groups (like physical positioning) can create asymmetric levels of bias across group members, whether 2) this asymmetry comes without the unintended consequences of "focusing on others," and whether 3) the asymmetry reflects bias reduction for middle group members. In concrete terms, we predicted that individuals' positioning would shape the visual accessibility of others, with the middle position in a row making others and their contributions more accessible than either of the outside positions. As positioning is a less "active" method of accessing others' contributions than focusing on others, we expected it to make others' contributions more available without evoking conscious comparisons, reducing the bias without the side-effects.

Attributional Bias

A number of researchers in the 1970's (e.g., Bradley, 1978; Miller & Ross, 1975; M. Ross & Sicoly, 1979) brought the existence, ubiquity, and implications of the attributional bias to psychologists' attention. It is but one of the many self-oriented biases that psychologists have uncovered. Indeed, a variety of judgments vary widely when they concern the self versus others. For example, people often indicate that they are better drivers (Svenson, 1981), teachers (Gilovich, 1991), and managers (Larwood & Whittaker, 1977) with fewer health problems (Weinstein, 1980) than others. More recently, Epley and Dunning (2000) found that people overstate the probability that they will act charitably. Likewise, Heath (1999) found that people claim to be more motivated by intrinsic factors (i.e., learning new things) than their peers are.

Researchers have established the robustness of the attributional bias, in particular, across both laboratory settings (M. Ross & Sicoly, 1979) and field settings (Mullen & Riordan, 1988) like sports. A recent meta-analysis of 266 studies, with 503 independent effect sizes, (Mezulis, et al., 2004), yielded an average d equal to 0.96, indicating substantial bias. Since the initial formulations of attributional bias, psychologists have grappled with two classes of explanations for it – motivational (self-enhancement) (e.g., Bradley, 1978) and cognitive (availability) (e.g., Miller & Ross, 1975). The motivational explanations suggest that self-serving attributions reflect a need to see the self positively (Bradley, 1978). The cognitive explanations suggest that these judgments reflect the differential availability of information about the self and others (Miller & Ross, 1975).

Following recent investigations (e.g., Caruso, et al., 2006; Epley, et al., 2006), we take no position with respect to the motivation/cognition debate, but assume that availability accounts for

at least a portion of the attributional bias. Under that assumption, we examine the ability of structural variables like physical positioning to influence the availability of information about the self and others – and thus generate asymmetries in attributional bias.

Availability and Asymmetry in Attributional Bias

An availability account of the attributional bias holds that we ascribe excessive credit to ourselves because what we have done is more apparent, memorable, and retrievable than what others have done (Miller & Ross, 1975; M. Ross & Sicoly, 1979). Whereas we have direct access to our own efforts (we experience them ourselves, as an actor), we have no direct access to others' efforts. Their contribution is unclear. Because we cannot access others' efforts, these efforts are easy to underestimate at each stage of the process: perception, encoding, and retrieval (Miller & Ross; M. Ross & Sicoly, 1979). The availability account thus posits a cognitive mechanism – processing of asymmetric information about the self and others – which naturally evokes biased attributions. Thus, asymmetric perceptions lie at the heart of the attributional bias, raising the possibility that they might also motivate its solution.

It follows from the availability account that any factors capable of reducing the asymmetry – by making others' versus own contributions more available – should also reduce the attributional bias. A variety of investigators (e.g., Burger & Rodman, 1983; Caruso, et al., 2006; Epley, et al., 2006; Savitsky, et al., 2005) have provided consistent evidence, finding that an active focus on others' contributions can make those contributions more available. All of these approaches, however, rely on a focal actor consciously changing his or her behavior by focusing more attention on others. This conscious focus, in turn, evokes clear comparisons between the efforts of oneself and others (Caruso, et al., 2006; Epley, et al., 2006).

Groups attempting to implement the "focus on others" solution in practice may face several challenges. Individual members may react to instructions constraining something as fundamental as the object of their attention (Brehm, 1972), perhaps even by focusing *more* attention on themselves (Storms, 1973). In organizations, individuals may simply ignore instructions leading them to downplay their own contributions when such instructions conflict with other, self-relevant goals like career advancement (Gioia & Sims, 1985). Finally, and most importantly: when individuals do comply with requests to focus on others' contributions, the act of doing so can generate dissatisfaction (Caruso, et al., 2006; Epley, et al., 2006), especially among genuine contributors.

The reason is that individuals instructed to consider the contributions of others tend to anchor on their own contributions (Gilovich, Savitsky, & Medvec, 2000), making any gap in contributions especially salient (Caruso, et al., 2006; Epley, et al., 2006). Thus, an active focus on another's contributions evokes a contrast effect (Sherif & Hovland, 1961), making the contribution gap (not the other's *absolute* contributions) salient. Gaps that seem inequitable then prompt dissatisfaction (Loewenstein, Bazerman & Thompson, 1989). Ultimately, the most inequitable gaps are those seen by genuine contributors. Thus, even if the intervention leads groups to espouse less bias overall, genuine contributors tend to leave the groups dissatisfied (Caruso, et al., 2006; Epley, et al., 2006).

These findings, if ambiguous for the "focus on others" solution, do suggest a relatively unexplored feature of attributional bias: Asymmetry at the individual level. Many existing studies (e.g., Ross & Sicoly, 1979) imply that group members display uniform levels of

attributional bias. However, the fact that genuine contributors feel less satisfied than others after considering contributions suggests that group members may espouse different levels of bias, at least subjectively. Thus, treating the bias of each member as equivalent may mask important differences across group members. Additionally, the prior findings suggest the form of an alternate remedy: Since dissatisfaction arises from a conscious comparison of own and others' efforts, a remedy that discouraged conscious comparisons might not reduce anyone's satisfaction.

Positioning and Asymmetric Bias

These considerations led us to examine variables that operate unconsciously, but powerfully: structural variables, defined as subtle, situational factors (Nisbett & Wilson, 1977; L. Ross & Nisbett, 1991). We reasoned that these variables, operating unconsciously, would be less likely to prompt conscious effort comparisons, reactance (Brehm, 1972), or refusal. Among structural variables, our study investigated whether one – physical positioning – could influence attributional bias without the satisfaction side-effects.

Psychologists have demonstrated repeatedly that structural variables can have vast and powerful effects (e.g., Bargh & Chartrand, 1999; Cialdini, Reno, & Kallgren, 1990; Tversky & Kahneman, 1981). People are unlikely to react (Brehm, 1972) against these factors because, in many cases, the factors are unlikely to be perceived – at least not as attempts to constrain their behavior (L. Ross & Nisbett, 1991). Thus, we did not expect these variables to generate reactance or refusal. Likewise, whereas conscious comparisons call forth contrast judgments (Lombardi, Higgins, & Bargh, 1987), structural variables can influence the availability of information without prompting any judgments at all (L. Ross & Nisbett, 1991). In this case, we predicted that

structural variables could make others' contributions more or less apparent without calling for a comparison.

We focused on physical positioning – defined, at the individual level, as where each group member sits relative to others. We chose this variable because it offered a particularly clear test of the availability mechanism described above. Although many structural variables can influence the availability of contributions, positioning directly manipulates this salience by controlling individuals' field of vision: positions make it easy to see some group members and hard to see others. In particular, they make some members directly visible, and they hide others from view.

Furthermore, given the need to position every group *somehow*, positioning was likely to focus attention unconsciously, altering the visual availability of others without prompting conscious comparisons. To the extent that positioning made others more available, we expected individuals to demonstrate less bias: configurations that maximized visibility should minimize bias. Indeed, the more people can see something, the easier it is for them to cognitively-retrieve information about it (Gabrielcik & Fazio, 1984; Tversky & Kahneman, 1973), and the more easily they can retrieve information, the more likely they will make attributions that reflect it (Higgins & Lurie, 1983; Pryor & Kriss, 1977; Rholes & Pryor, 1982). However, to our knowledge, visual accessibility has not been studied in the context of attributional bias.

Here, we examined three-person groups, with members seated in a row, on the premise that this configuration would maximize asymmetry between group members' perceptions and thus create asymmetry in their contribution judgments. The position that would make others contributions' most visible is the middle. This position affords a view of both others, along with their

contributions. By comparison, sitting on the outside affords full exposure to the contributions of just one other person. The mere availability of more or less information about contributions, via visual accessibility, should create asymmetries in attributional bias. Thus, in a three-person group:

> *Hypothesis 1: The middle group member will demonstrate less attributional bias than either of the people on the outside.*

Thus, in a sense, outside group members served as controls for middle group members. Because our primary goals were to demonstrate that: 1) asymmetric bias exists in groups and 2) the bias can be explained by the availability associated with positioning; we were most concerned with documenting that middle members demonstrate the least bias.

Much research on the bias has used three-person groups (Mezulius, et al., 2004), in which equal visual access – by everyone, to everyone – is probably the exception. Thus, we reasoned that prior participants had experiences more like our outside group members than our middle members. Accordingly, we predicted that outside members' bias would resemble prior participants' bias; thus, the middle position in our study would *reduce* bias, rather than the outside position *increasing* it. Because members in any position should contribute an average of one-third of the group's outcome, claims of one-third or less from middle, but not outside members would provide support. If outside members claimed contributions consistent with prior research, this claim would be even stronger. A recent investigation of the bias using a questionnaire methodology (Caruso, et al., 2006) documented individual credit claims of approximately 47%. Thus:

> *Hypothesis 2: Middle group members will claim approximately one-third of the credit, while outside members will claim substantially more.*

Finally, we expected positioning to reduce attributional bias without influencing group members' satisfaction, predicting that all members' satisfaction would be equivalent, since none would make a conscious comparison. Given the null nature of this prediction, we examined the associated means and p-values rather than presenting it as an additional hypothesis.

Study: Group Positioning

We conducted a laboratory study, assigning group members' positions to influence the extent to which they could effectively witness others' contributions. We assembled participants into three-person groups and asked groups to complete a numbers task involving the identification of as many numbers as possible that met predetermined conditions. We then isolated participants and asked them to complete a questionnaire about their relative contribution to the group. We also asked them to complete another numbers task, to provide an approximation of their objective contribution. We compared attributions of responsibility for participants with different physical positioning in the group, generally expecting middle members to exhibit the lowest levels of attributional bias.

Participants

We recruited 66 undergraduate participants (40% women) from a major University in Spain, using campus-wide advertisements, for an experiment about "Decision Making." The participants were mostly (95%) Business and Economics majors in their third year. We do not report gender effects in this study since: 1) we did not find any ($p > .25$), 2) a similar, but independent study with a sample of 111 undergraduate participants revealed no gender effects

(Corgnet & Sutan, 2007)[1], and 3) classic research in this arena (e.g., M. Ross & Sicoly, 1979) suggests the absence of gender effects. All study procedures were conducted in Spanish, but were independently translated to English for the current paper. Our experiment was completed in three sessions of approximately twenty participants each. Participants learned that the experiment would last for 60 minutes, and that they would receive a show-up fee of 5 euros (equivalent to $6.50 at the time), plus a potential performance-based payment. Average earnings for the three experimental sessions were 18 euros ($23.40).

Design

Procedures. At the start of the experiment, participants were randomly assigned a number and a letter (e.g., 1-L) that indicated, respectively, their group's number and their individual, physical positioning in the group. Each group was composed of three members randomly assigned to sit in a row, on one side of a rectangular desk, in a private room. Participant L sat to the left of participant M, and participant R to the right, following signs placed on the table. This configuration ensured that the middle participant naturally had the most visual access to others. In the first stage of the experiment, groups had 18 minutes to find three- and four- digit numbers fulfilling certain conditions, described below. This "numbers" task was adapted from prior research using numerical optimization tasks (e.g., van Dijk, Sonnemans, & van Winden, 2001, Montmarquette, Rulliere, Villeval, & Zeiliger, 2004). Each correct number earned a 45 euro cents ($0.58) bonus, while each incorrect number garnered a penalty of 30 euro cents ($0.39). Each group had access to only one set of instructions and one answer sheet, to encourage

[1] Participants (54% women) undertook a task similar to the one presented here. Perceived contribution for women (M = 54%, SD = 0.12) did not differ from the perceived contribution of men (M = 55%, SD = 0.15), t(109) = -0.42, p = 0.67.

members to work together. In addition, members had to communicate and coordinate to avoid finding the same correct answers to the task.

Group task. In the group task (described to participants as "task 1"), groups received the following instructions:

> *You have 18 minutes to find as many numbers as you can, satisfying the following conditions:*
> - *It has 3 or 4 digits.*
> - *If you sum its digits, the result is equal to 15.*
> - *If you multiply its digits, the result is strictly larger than 10.*
> - *The last two digits are strictly larger than 1.*
> - *The first digit is an odd number.*
> - *The second digit is an even number.*

Sitting next to each other in a row, group members read the instructions, then discussed strategies and solutions to the problem. They recorded their solutions on a shared answer sheet. Other than the requirement to remain in their seats, we placed no constraints on how groups approached the problem, as we wished to avoid introducing any unnecessary experimental artifacts. Ultimately, visual availability involved witnessing other group members at work. Visible members might be observed performing calculations, correcting mistakes, proposing strategies, and announcing or adding solutions to the answer sheet. Others might infer their thinking from the furrowing of their brows, their gaze at the answer sheet, or the raising and lowering of their pencils.

Visible members might be seen furrowing their brows, staring at the answer sheet or prior answers, raising or lowering their pencils, performing calculations, correcting mistakes, proposing strategies, and announcing or adding solutions to the answer sheet.

Individual tasks. In the individual portion of the experiment (described as "task 2"), participants went to private cubicles and answered a series of paper-based questions, individually and without communication, to assess their contribution to the joint outcome during the first task. The Appendix details these questions.

Then, participants completed an individual numbers task, which was essentially the same as the group task. The only difference was that the digits had to sum to 14 instead of 15. In the individual task, each correct number earned 30 euro cents ($0.39), while each incorrect number incurred a penalty of 15 euro cents ($0.20). Because the individual task essentially required participants to repeat the group task alone, participants' individual performance both measured their individual ability and provided an approximation of their involvement in the group task. In other words, participants' individual performance allowed us to construct an estimate of their actual contributions to the joint outcome in the group task. Our argument is based on the finding that performance on this task involves a learning component, so a participant who contributed heavily to the group task would tend to perform well on the individual task too. An independent sample (Corgnet, 2010), N=60, confirmed that: experienced participants outperformed inexperienced participants by approximately 30%. Thus, we felt comfortable using individual performance as an initial approximation of contribution to the group task.

Of course, our estimate of contributions is imperfect. For example, participants may have exerted less effort when working in a group as a result of social loafing (Jackson & Harkins, 1985; Karau & Williams, 1993), distorting our measure of contribution based on individual performance. Indeed, outside group members may be more inclined to loaf than middle members if their performance is less accessible (Williams, Harkins, & Latane, 1981). However, we believe that

social loafing was not the primary mechanism: First, participants themselves indicated that their efforts on the two tasks were comparable: Twenty out of twenty-one participants (95%) during the first of three data collections[2] indicated that they exerted the same level of effort in both the individual and group task (the near universality of this response led us not to measure it in subsequent collections). Second, the heart of the social loafing explanation is that outside group members would loaf more than middle members. However, perceptions of outside members' contributions (by middle members) and middle members' contributions (by outside members) were similar, $p = 0.84$. Third, the performance of outside and middle members on the subsequent, individual task was similar, $p = 0.59$, suggesting that they contributed just as much to the group effort. Fourth, the task itself may have discouraged loafing, as it involved group members announcing their answers aloud; this attribute of the task, if not members' positioning, made their contributions evaluable by others (Williams et al., 1981). Finally, the literature on moral hazard in teams (e.g., Holmstrom, 1982) has indicated that loafing is less likely when the cost outweighs the benefits. As each correct answer garnered substantial, individual benefits (amounting to $23.40 per hour), and debriefing indicated that participants saw the task as "fun" rather than effortful, it is likely that the costs of loafing did outweigh the benefits. Ultimately, any distortions are likely to reduce our statistical power, creating a conservative test.

Independent Measures

Participants were randomly assigned to a physical position in the group. The positioning variable identified whether a participant was located in the middle (coded as 1) or on the outside (coded as 0). We also recorded whether outside participants sat on the right or left.

[2] We refer to our first data collection, which had a total of twenty-two participants. In this paper, we present the results of three independent experimental sessions with 21, 24 and 21 participants, respectively.

Dependent Measures

We created four, partially-overlapping measures of attributional bias and a measure of participants' satisfaction. We first measured group members' claims about their own contribution to the joint output (following Epley, Caruso, & Bazerman, 2006), calling it "perceived contribution." Our second measure, which we called "estimated contribution," gauged the relative performance of group members on the individual task (task 2). Our third measure, called "estimated bias," was the difference between perceived contribution and estimated contribution. Finally, we created a measure of attributional bias at the aggregate level called "aggregate perceived contribution," corresponding to the sum of group members' perceived contributions. A separate item, detailed below, assessed participants' satisfaction.

Perceived contribution. We assessed individuals' perceived contribution by analyzing their answers to the following, open-ended question, asked in the individual stage of the experiment: "What was your individual contribution, in percentage terms, from 0% to 100%, to the performance of the group?" By design, this measure gauges the perceived, rather than actual contribution of each group member. To estimate members' actual contributions, we introduced the following measure.

Estimated contribution. Our estimate of a given participant's contribution in the group task was based on an independent measure of ability on the task. Estimated contribution of group members to the joint outcome was measured as the ratio between their individual performance and the sum of all group members' performances during the individual task. If all members

reached the same level of performance in the individual task, the estimated contribution of each member would be equal to one-third.

Estimated bias. We then used our estimate of group members' contributions, defined above, to construct a measure of estimated bias. Estimated bias was operationalized as the difference between their perceived contribution and estimated contribution, defined previously.

Aggregate perceived contribution. This aggregate-level measure was computed as the sum of group members' perceived contributions. An aggregate perceived contribution significantly greater than one reveals the existence of biases at the aggregate level.

Satisfaction. We measured participants' satisfaction by asking the following question during the second stage of the experiment: "How would you rate your satisfaction with your work group experience in task 1 (1=Very poor, 2=Poor, 3=Acceptable, 4=Good, 5=Very Good)?"

Results and Discussion

Before exploring the hypotheses, we first sought to document the existence of the attributional bias in our sample. The average perceived contribution was equal to 42.8% (see Table 1). This average, perceived contribution is comparable to similar studies based on a questionnaire methodology (Caruso, et al., 2006; M. Ross & Sicoly, 1979). We can reject the hypothesis that the mean perceived contribution in our sample equals one-third, $t(65) = 5.42$, $p < 0.001$, $d = 1.35$. In addition, the computation of the aggregate perceived contribution measure indicates that all of the twenty-two groups except one exhibited bias at the aggregate level. We can reject the

hypothesis that aggregate perceived contribution (128.4%) is equal to 100%, $t(21) = 5.35$, $p < 0.001$, $d = 2.33$.

Hypothesis 1 predicted that middle group members would demonstrate less bias than outside members. Our data provided support (see Table 2): Middle members claimed less credit for the group's outcome ($M = 0.38$, $SD = 0.13$) than did outside members ($M = 0.45$, $SD = 0.15$), $t(64) = 2.03$, $p = 0.05$, $d = 0.51$. Figure 1, a histogram of perceived contributions for middle and outside members, presents these findings graphically. We pooled data from outside members since, as predicted, claims for contribution did not significantly differ between group members seated on the left ($M = 0.45$, $SD=0.14$) and right ($M = 0.45$, $SD = 0.16$), $t(42) = -0.03$, $p = 0.98$, $d = -0.01$.

In addition to difference scores, we sought additional evidence for Hypothesis 1 by estimating a multivariate regression in which we controlled for the effect of the estimated contribution of each group member (see Table 3).[3] The regression allowed us to examine perceived contributions as a function of both position and estimated, actual contribution. As indicated in Table 3, physical positioning significantly predicted members' perceived contributions to the joint outcome, even after controlling for estimated individual contribution. The coefficient associated with physical positioning was negative, meaning that middle group members offered lower perceptions of their own contributions to the joint outcome than other group members did.

Hypothesis 2 predicted that the middle position would effectively reduce attributional bias. In support, the credit claimed by middle members did not differ significantly from one-third, $t(21) =$

[3] We considered an additional regression analysis in response to possible concerns regarding the use of difference scores (Edwards, 1995; Edwards, 2001). We estimated different specifications for the multivariate regression by including non-linear and interaction effects. Our results did not depend on the use of alternative specifications.

1.72, $p = 0.10$, $d = 0.75$, while the credit claimed by outside members was significantly greater than one-third, $t(43) = 5.46$, $p < 0.001$, $d = 1.67$. In addition, middle members exhibited significantly lower estimated bias ($M = 0.03$, $SD = 0.13$) than outside members did ($M = 0.13$, $SD = 0.15$), $t(64) = 2.52$, $p = 0.01$, $d = 0.63$. Estimated bias did not differ between outside members seated on the left ($M = 0.15$, $SD = 0.16$) and right ($M = 0.11$, $SD = 0.15$), $t(42) = 0.91$, $p = 0.37$, $d = 0.28$. In addition, the biases of outside group members resembled the biases of participants in Caruso, et al. (2006). As noted, these authors documented perceived contributions of approximately 47%, remarkably close to the claims of our outside members (45%), and substantially higher than those of our middle members (38%). This all supports the notion that the middle position reduced bias (Hypothesis 2).

Finally, despite significant differences in the magnitude of attributional biases, we did not find significant differences in satisfaction between middle members ($M = 3.50$, $SD = 0.91$) and outside members ($M = 3.51$, $SD = 0.70$), $t(63) = 0.06$, $p = 0.95$, $d = 0.02$. On the contrary, their reported satisfaction was nearly identical.

An alternate interpretation of our results would suggest that middle group members, because of their positioning, were assigned to clerical tasks such as filling out the answer sheet, without contributing to the intellectual effort of the group. However, a pilot question, completed by 21 participants, indicated that outside group members perceived the middle member's contribution as 32.7% ($SD = 0.10$), which did not differ significantly from one-third, $t(13) = -0.10$, $p = 0.92$, $d = -0.06$. Also, since experience on the numbers task tends to improve performance, we would expect middle group members to underperform outside members in the individual task if they had dedicated their group interaction to clerical tasks. As noted, however, the individual

performance of middle members (M = 24.7, SD = 9.5) and outside members (M = 26.1, SD = 10.5) did not differ, t(64)=-0.54, p = 0.59, d=-0.14. In addition, debriefing indicated that participants did not consider clerical tasks, like writing numbers on the answer sheet, sufficiently important to assign someone exclusively to that endeavor. Instead, most participants said that their teams divided the work by numbers, allotting each person a separate range of numbers to compare against the criteria.

Exploratory analyses. On a more exploratory basis, we also examined the underlying mechanism, and the accuracy of group members' perceptions. If visual availability is the mechanism, then *others'* perceived contributions should also vary as a function of positioning. Specifically, group members should see those outside their field of vision as contributing less than others. For three-person groups in a row, this suggests that outside group members will rate the contributions of their outside counterparts as minimal. Meanwhile, everyone will rate their "neighbors" as contributing substantially. Thus, outside members will rate the contribution of middle members, and middle members the contribution of outside members, highly. Experimental logistics only allowed us to test these predictions on a subset of our sample, so we advance it as an exploratory prediction.

Consistent with predictions, outside members' bias seemed to stem from an undervaluation of the contributions made by counterparts at the other end of the table. Outside members' perceptions of their outside counterpart's contributions (M = 0.26, SD = 0.16) were significantly less than one-third, t(13) = -1.92, p = 0.04, d = -1.07. Estimated bias (M = -0.08, SD = 0.18) was

also significantly less than zero, t(13) = -1.78, p = 0.05, d = -0.99.[4] Also, outside members' perceptions of their outside counterpart's contributions (M = 0.26, SD = 0.16) were significantly lower than their perceptions of the middle member's contribution (M = 0.33, SD = 0.10), t(26) = -1.52, p = 0.07, d = -0.60. This is consistent with a visual access mechanism, since positioning seemed to prevent outside members from observing each other's contributions accurately. Figure 2, a histogram of contributions perceived by outside members, presents this information graphically.

Meanwhile, middle members' perception of outside members' contribution (M= 0.33, SD = 0.10) and outside members' perceptions of middle members' contributions (M= 0.33, SD = 0.11), t(26) = -0.19, p = 0.84., d = -0.07, both hovered around 1/3. This suggests that members perceived their neighbor's contribution without bias, whether they sat in the middle or on the outside. Middle members seemed to have an accurate perception of other group members' contributions because they were everybody's neighbor. Also, outside members tended to perceive the contribution of the middle group member "objectively," since the difference between outside members' perceived contribution of the middle member (0.33) and estimated contribution of the middle member (0.35) did not significantly differ from zero (M = -0.02, SD = 0.18), t(13) = -0.32, p = 0.75, d = -0.18.

Also on an exploratory basis, we compared middle and outside members' accuracy in assessing their partners' contributions. We defined a participant's accuracy as: [1 — (the absolute

[4] We conducted directional tests where the alternative hypothesis is that perceived contribution (estimated bias) of other outside members is lower than one-third (lower than zero). Our N for these tests is small because laboratory limitations only allowed us to collect this data for a subset of our sample. Thus, we interpret these latter data with caution.

difference between the participant's assessment of the two partners' contributions and the partners' actual contributions)]. Accuracy would equal one whenever perceived and actual contribution were equal. Middle members' accuracy ($M = 0.90$, $SD = 0.07$) was greater than outside members' accuracy ($M = 0.84$, $SD = 0.12$), $t(64) = -1.67$, $p < 0.05$, suggesting again that middle members' physical positioning afforded greater insight into the contributions of people around them.

General Discussion

We started our investigation with the conjecture that simple structural variables like positioning could create asymmetries in attributional bias, without influencing group members' satisfaction. We even suspected that these asymmetries would reflect reductions in bias for middle group members. We derived our predictions from the availability interpretation of the attributional bias, under which people ascribe more credit to themselves than is objectively due, primarily because what they do is more apparent than what others actually do.

A laboratory study suggested that physical positioning is at least one structural variable that can reduce the attributional bias of at least one group member. Operating through the availability mechanism, members located in the middle of a group demonstrated less bias than members seated on the outside, with no apparent decrement in satisfaction, nor apparent increase in bias from outside members. Indeed, outside members demonstrated bias levels consistent with prior research. Apparently, outside members had insufficient access to one another's contributions, and were thus likely to underestimate these contributions. In contrast, middle members' extensive visual access seemed to lend them neutrality in credit assignment. Overall, middle members seemed to espouse less bias than prior participants. These findings constituted initial

evidence for the effect of at least one structural variable, physical positioning, on the magnitude and symmetry of attributional bias.

Implications for Asymmetry Research

Our research suggests that a variety of asymmetries characterize and underlie the well-documented attributional bias. An informational asymmetry (more information about own versus others' contributions) is one mechanism generating biased contribution judgments in the first place. A contribution asymmetry (greater actual contributions from some than others) curbs genuine contributors' satisfaction when asked to focus on others, as a means of bias reduction. Group positioning exacerbates or reduces informational asymmetry (depending on where the individual is located). Therefore, attributional bias itself appears asymmetric.

Because positioning seemed to elicit bias reduction for middle members, and little change for others, positioning may effectively reduce the group's overall bias. Thus, our results suggest that at least one asymmetry may be helpful: Group positioning, conceived with bias reduction in mind, could reduce bias-inspired group conflict. More generally, when an asymmetry serves to reduce a dysfunctional feature of group life like attributional bias (for some members, without increasing it for others), the asymmetry may actually improve overall group functioning.

Before drawing these conclusions too strongly, however, several cautionary notes are warranted: First, our effects were primarily individual-level, so group-level implications require systematic, future research. Second, two of three group members in our study still demonstrated bias, suggesting that the potential for conflict was far from nil. Finally, our research examined only

one of many structural variables relevant for groups, and capable of generating asymmetries. We welcome future research that tackles others.

Nevertheless, the current empirical context allowed us to examine a number of important issues related to asymmetry. We identified visual access as an important antecedent of asymmetric bias, and availability as one of its mechanisms. Our research suggested that reduced conflict might be one important outcome of asymmetric bias. We view the current research as a first step toward uncovering many asymmetries that may somehow help groups.

Extensions to Groups and Organizations

From the results emerge a number of tangible steps that organizations and work groups might use to leverage asymmetric bias. Asking group members to sit in a circle is one, obvious possibility: circular configurations make the contributions of all group members maximally, though perhaps not equally-available. Another possibility is using mechanisms other than positioning to direct group members' attention toward others' contributions. Indeed, our study suggests that many real, structural variables in work groups and organizations (e.g., group size or task) might generate comparable asymmetries in contribution assessments.

In fact, we have some preliminary data to support both of these possibilities: smaller groups and groups working on objectively-measurable tasks both seem to espouse less bias uniformly, not asymmetrically, in a paradigm similar to the one above. However, these studies did not systematically manipulate group positioning, so we cannot examine interactions between the structural variables. Overall, many structural variables in organizations could influence bias, asymmetrically or otherwise. For example, the presence or absence of public metrics (like

bulletin boards highlighting sales volume) that make the real-time performance of group members clear might influence employees' contribution judgments. Individuals seated in view of these bulletin boards, for example, might show reduced bias.

Limitations, Future Directions, and Conclusion

Our analysis showed that positioning, and possibly other structural variables in groups, can asymmetrically reduce attributional bias without reducing satisfaction. This suggests that structural variables may play a role in improving group performance and reducing group conflict, as mediated through asymmetric individual experience. The multiple indicators of the same, converging conclusion lend strong credibility to the current research. However, our analysis, by focusing on physical positioning, constitutes only a preliminary step in developing a comprehensive framework to assess the importance of structural variables. Furthermore, the current results used a single (albeit validated) task, and our own research suggests that task type matters. Finally, the current results derived from an undergraduate sample in a laboratory context. Although this context afforded control over the many variables confounding real group life, it means that generalizing our results to various real-life contexts requires systematic, future research.

In particular, studying asymmetric bias in real organizations would help to generalize our findings, practically and theoretically. For example, future research might examine the biases of groups using different types of workspaces and workflows. The former research might examine whether groups using "open-floor" plans (which allow visibility into others' contributions) demonstrate less bias than groups using cubicles (which hinder visibility), controlling for other differences. The latter research might examine whether groups using interdependent workflows

(encouraging visibility) demonstrate less bias than groups using independent workflows (hindering visibility). Practically, either finding would generalize our findings to a broad group of real organizations. Theoretically, either finding would support and clarify the underlying mechanisms. Such studies might also allow us to pursue new theoretical avenues—disaggregating group members' effort from performance, for example, or examining alternative mechanisms. Of course, further laboratory studies might shed light on these issues as well.

Another, promising avenue for future research may consider the influence of information technologies on attributional bias. Research has identified a variety of ways that computer-mediated communication (CMC) systems, in particular, can make others more or less available (e.g., Walther, 1996). In organizations, CMC may facilitate the assessment of group members' contributions by disseminating real-time information about these contributions. By precluding visual access to the group members themselves, however, CMC may simultaneously compound attributional bias. Which way the bias goes in a virtual world is an important question. Research could easily address it by comparing the perceived contributions of individuals working side-by-side with those of individuals working virtually, aided or not aided by real-time metrics. In any case, CMC clearly introduces the potential for new forms of asymmetry in bias.

As this discussion suggests, the current research is a first step that affords many avenues for future study. The basic idea that structural variables can reduce attributional bias without reducing satisfaction seems general enough to extend across contexts, but specific enough to generate clear prescriptions. Overall, managing structural variables in groups seems a low-cost solution to the high-cost dissatisfaction of disaffected group members – a means of harnessing asymmetry in service of group harmony.

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Figure 1: Histogram of perceived contributions and physical positioning

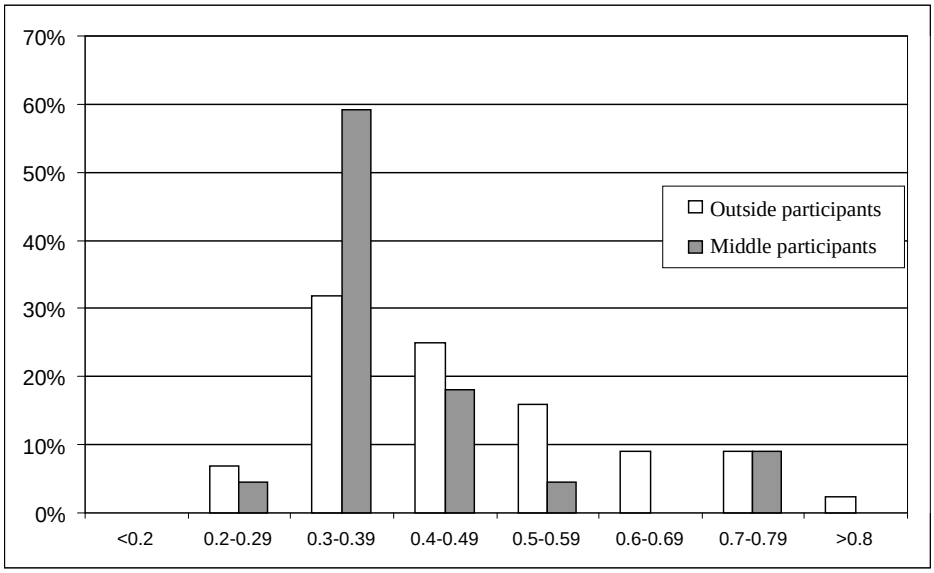

Figure 2: Histogram of outside members' perceived contributions of other outside members (outside/outside) and middle members (outside/middle)

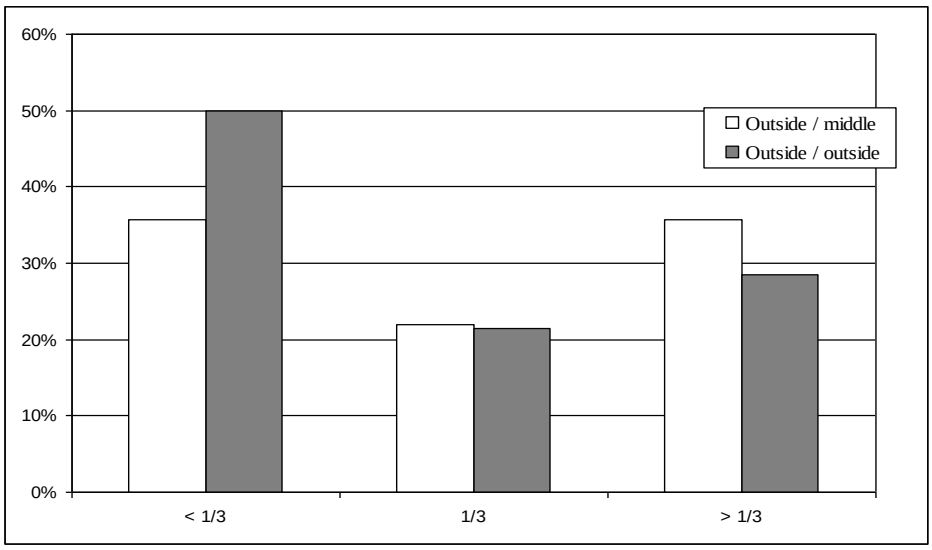

Table 1: Perceived contributions

Perceived contributions	**Total** (Proportion of participants)
<1/3	24.2%
=1/3	9.1%
>1/3	66.7%
Average perceived contribution	42.8%

Table 2: Perceived contributions and group members' physical positioning

Perceived contributions	**M members** (Proportion of participants)	**L and R members** (Proportion of participants)
<1/3	40.9%	18.2%
=1/3	9.1%	9.1%
>1/3	50%	72.7%
Average perceived contribution	37.7%	45.3%

Table 3: OLS regression

$PCO_i = \alpha_0 + \alpha_1 CON_i + \alpha_2 POS_i + \varepsilon_i$

PCO_i is member i's perceived contribution

CON_i is the estimated contribution of member i as measured using group members' relative performances in task 2

POS_i is a dummy variable that takes value one if member i was in the middle

Dependent variable *Perceived contribution*	**Coefficient** (Standard errors)
Constant	0.302 (0.053)
Contribution (CON)	0.464*** (0.151)
Position (POS)	-0.085** (0.035)
R^2 (66 observations)	0.184

Appendix: Individual Questionnaire

These questions were answered after task 1 and before task 2.

Section 1

What was your individual contribution, in percentage terms, to the performance of the group?

Section 2

(Outside group members only)

1-What was the individual contribution to the performance of the group, in percentage terms, of the middle participant?

2-What was the individual contribution to the performance of the group, in percentage terms, of the other outside participant?

(Middle group members only)

1- What was the individual contribution to the performance of the group, in percentage terms, of the participant on your left?

2- What was the individual contribution to the performance of the group, in percentage terms, of the participant on your right?

Section 3

1-How would you rate your satisfaction with your work group experience in task 1?

1=Very poor
2=Poor
3=Acceptable
4=Good
5=Very Good

2-Choose one of the following statements:

I exerted more effort in the individual task 2 than in the group task 1.
I exerted the same level of effort in the individual task 2 and in the group task 1.
I exerted a lower level of effort in the individual task 2 than in the group task 1.