BETTER LAGGED THAN NEVER:
THE LAGGED EFFECTS OF PROCESS INTERVENTIONS ON GROUP DECISIONS

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ABSTRACT

This study investigated three issues regarding process interventions in group decision making: (1) how process interventions affect group decision making processes and outcomes; (2) how persistent these effects are, and (3) how the timing (earlier vs. later) and type (directive vs. participative) of process intervention moderate these effects. The key finding was that process interventions had immediate effects on critical group processes, but did not significantly improve decision quality during the task in which the intervention was received. Surprisingly, post-intervention processes continued to improve and resulted in improved decisions in a subsequent task. This "lagged" effect was mediated by the degree to which groups aggregated unique information and avoided advocating for individual members' preferences.

INTRODUCTION

Changing the behavior of in-process decision-making groups has troubled researchers and practitioners for decades. Unpredictable events and the emergence of dysfunctional processes can derail even the most well-constructed groups. The research reported in this paper builds on and integrates existing work on group decision making, group process, and team coaching to provide information about two key issues: (1) how and when to intervene once a group begins discussion and (2) the conditions under which group process improvements persist and build capacity for future decisions.

Recent research on improving group decision-making has focused on two contributors to deficient group decision-making: (1) biased information pooling, and (2) excessive preference negotiation (Brodbeck, et al., 2007). First, group members tend to discuss more shared than unshared information; however, unshared information is more likely to improve decision quality under certain conditions (Winquist & Larson, 1998). Second, focusing on advocating for specific alternatives before all information is discussed can also harm decisions (Brodbeck, et al., 2007). Many of interventions have improved information pooling (e.g. Galinsky & Kray, 2004; Hollingshead, 1996; Larson, Foster-Fishman, & Franz, 1998; Postmes, Spears, & Cihangir, 2001) and recent meta-analytic results link information pooling to performance in hidden-profile decision-making tasks (Mesmer-Magnus & DeChurch, 2009). Thus, I predict that process interventions made during the task will have their intended effects on key processes and improve group decisions:

> *H1. Groups receiving process interventions will (a) pool information more and negotiate preferences less, and (b) make better decisions on an initial task than control groups. (c) Information pooling and reduced preference negotiation will mediate the effects of process interventions on decision quality.*

Interveners face tradeoffs between intervening earlier when processes are more flexible, and later when the group has more task experience. Earlier interventions target processes while

they are more malleable (Ericksen & Dyer, 2004; Ginnett, 1993) and less routinized (Gersick & Hackman, 1990; Okhuysen & Waller, 2002; Zellmer-Bruhn, Waller, & Ancona, 2004). On the other hand, later interventions give groups a better chance of understanding the content and value of that intervention (Hackman, Brousseau, & Weiss, 1976; Woolley, 1998), allow groups time to learn from their own mistakes (Edmondson, 2003; Sitkin, 1992), and to increase internal reflective processes (Schippers, Den Hartog, Koopman, & Wienk, 2003). It is thus difficult to predict how timing alone will influence group decision-making processes and outcomes.

The difference between when an early intervention is more or less effective than a later intervention rests largely on the type of the intervention. Essentially, directive interventions tell group members what to do with a minimum of input from the group, whereas participative interventions invite member input. Directive process interventions offer several potential advantages over participative ones. First, directive process interventions should be relatively quicker than participative ones because directive interventions do not require group discussions, which diminish the time available to work on the task. In contrast to directive interventions, participative interventions have the potential to give more weight to potentially less-expert team members (Vroom & Jago, 1988) and to dilute the clarity of the intervention with a higher volume of ideas (Ford & Sullivan, 2004), especially in inexperienced groups. Consequently, when inexpert groups face time pressure, a directive approach may lead to faster results.

The benefits of directive interventions are most compatible with the opportunities offered earlier in group process. Because early events shape group process so strongly, the work patterns created by early directive process interventions are likely to persist until at least the temporal midpoint. If the intervention offers effective advice, then team process should improve in the short term (Peterson, 1997). Further, because brevity is one of the advantages of directive interventions, giving that intervention earlier when there is more time to apply it should help; using a directive approach later in group process forfeits that advantage and targets stronger, more entrenched processes without leveraging the experience members have accrued, leading to the following hypothesis:

> *H2: Groups receiving earlier directive interventions will (a) pool information more and negotiate preferences less, and (b) make better decisions on an initial task than groups receiving other types of interventions.*

However, directive interventions also have potential drawbacks. Directive interventions imply relying on the intervener for feedback and advice. Therefore, teams that receive earlier, directive interventions may be more likely to become dependent on the intervener for advice and less likely to develop internal reflective processes, leading to a decrease in learning (Edmondson, 2003), thus inhibiting the potential for its effects to persist.

Participative interventions, on the other hand, have two clear advantages over directive ones: (1) they leverage the collective knowledge and experience of team members (Vroom & Jago, 1988) and (2) they tend to increase commitment to the intervention (Durham, Knight, & Locke, 1997; Tyler & De Cremer 2005). These advantages, though, are more likely to be realized later in a group's work together. Participative interventions are most beneficial when a team has specific, idiosyncratic knowledge of the interface between member skills and task strategy. Such knowledge can only be gained through experience and is therefore likely to be more effective later, rather than earlier, especially in newly-formed groups. Assuming the intervention is helpful, group discussion prior to the intervention will be inferior to group discussion after. Thus, because later interventions cannot improve performance on those parts of the task done before the intervention, interveners who delay their interventions sacrifice short-

term performance. Later participative interventions would particularly sacrifice short-term performance because they take longer to execute and introduce more perspectives, which likely take more time to integrate and apply. Thus, later participative interventions are likely to have lagged effects on group decisions, in which process changes occur quickly, but too late to affect immediate performance:

> *H3: Groups receiving later participative interventions will (a) pool less information and negotiate preferences more and (b) make worse decisions than groups receiving other types of interventions on an initial task. However, groups receiving later participative interventions will show a lagged effect, (c) pooling more information and negotiating preferences less and (d) making better decisions than groups receiving other types of interventions in a subsequent task.*

METHOD

To test the hypotheses above, this experiment used a 2 x 2 factorial design, crossing the timing of interventions (earlier vs. later) with the type of intervention (directive vs. participative) and including a control condition with no intervention. 105 three-person teams, composed of 315 individuals recruited through classified advertising and local study pools, were assigned to one of the five conditions. Participants were told that they were members of a 3-person group of investors opening a new gourmet restaurant. Each group performed two decision-making tasks during the experiment, choosing (a) one of three finalists for the position of head chef and (b) one of three potential locations to rent. Participants individually read a subset of the information about each of the three potential chefs/locations (decision options) and then discussed which of the options would be the best choice. Pieces of information favoring incorrect choices were jointly held by all three team members (shared information), while pieces of information favoring correct choices were uniquely held by one team member (unshared information) (i.e. Stasser & Titus, 1985; see Wittenbaum, et al., 2004 for a review).

Participants were instructed to read their individual information packets and to indicate which option they felt was best, which option they felt was worst, and their confidence in those rankings (1=not at all confident, 7=extremely confident), and to begin discussion of which option to choose after making those ratings. During the first task, experimental groups received either a directive or participative intervention from the experimenter, which both offered advice designed to encourage groups to share all information before evaluating the impact of the information on their final decisions. In the directive condition, the advice was framed as a best-practice. In the participative condition, the advice was framed as one possible strategy, which was given after a facilitated discussion of potential strategies. The interventions were delivered either 5 minutes (early condition) or 15 minutes (late condition) after groups began their discussions. After 30 minutes had passed, the experimenter collected the groups' written decision and distributed the materials for the second decision task.

All groups had scores for between two and six five-minute time periods in each task (e.g. Time 1, Time 2, etc.), as well as for the complete task, for information pooling (i.e. the discrete number of pieces of information mentioned during discussion) and preference negotiations (rated by coders). Decision quality was coded as either correct (1) or incorrect (0).

RESULTS

Two-way Analyses of Covariance (ANCOVAs) were used to test the effects of interventions on information pooling and preference negotiations, controlling for the effects of pre-discussion preferences. Binary logistic regressions were used when decision quality was the dependent variable. First, to assess how quickly interventions affected group processes, the five minute period following the Task 1 intervention was compared to the periods preceding it. These analyses revealed that early interventions significantly increased pooling of both shared ($F(1, 102) = 8.00$, $p < .01$) and unshared ($F(1, 102) = 10.10$, $p < .01$) information and decreased preference negotiations ($F(1, 102) = 7.35$, $p < .01$). There were no significant effects of the type of intervention in these analyses. Late interventions triggered a similar pattern of results – those receiving late interventions negotiated preferences significantly less than early and control groups ($F(1, 99) = 22.98$, $p < .01$) and pooled more unshared information ($F(1, 99) = 7.01$, $p < .01$). There was no significant effect of late interventions on pooling shared information ($F(1, 99) = 2.40$, *n.s.*), potentially because shared information tends to be discussed earlier in discussions (Larson, Foster-Fishman, & Keys, 1994). The type of intervention also had a significant effect on preference negotiations, such that directive interventions decreased preference negotiations more than participative interventions ($F(1, 99) = 5.40$, $p < .05$).

Next, tests of the overall effects of interventions on Task 1 processes and outcomes were conducted using 2-way ANCOVAs. In Task 1, there were significant main effects of intervention, showing that groups receiving interventions pooled more unique pieces of unshared ($F(5, 99) = 8.09$, $p < .01$) and shared information ($F(5, 99) = 7.85$, $p < .01$), while showing lower levels of preference negotiations than control groups ($F(5, 99) = 2.53$, $p < .05$). Thus, H1a was supported. H2a and H3a predicted an interaction between the timing and type of intervention, such that early directive and late participative interventions would show different effects on Task 1 processes. There were no significant effects of the timing or type of intervention or the interaction on these group process variables. Thus, H2a and H3a were not supported.

H1b predicted that process interventions would improve Task 1 decisions, relative to control. Binary logistic regressions were used to assess the impact of interventions and pre-discussion preferences on decision quality. In Task 1, interventions did not significantly predict the group decision quality, controlling for pre-discussion preferences ($\chi^2(1)=2.15$, p=.14). Omitting the control variable obtained similar results ($\chi^2(1)=2.42$, p=.12). Thus, H1b was not supported. H2b predicted that early directive interventions would be most successful in improving Task 1 decision quality, while H3b predicted that late participative interventions would be least successful. There were also no significant effects of the timing or type of intervention on Task 1 decision quality. Thus, H2b and H3b were not supported.

Logistic regressions were also used to asses whether group processes impacted decision quality. The number of unique pieces of shared and unshared information and the ratings of preference negotiation were simultaneously used to predict decision quality. In Task 1, this model significantly predicted group decision quality ($\chi^2(3)=20.56$, p<.001); only unshared information significantly contributed to the equation (Wald=8.29, p<.01). H1c predicted that the effects of process interventions on decision quality would be mediated by information pooling and preference negotiations. Preacher and Hayes (2008) bootstrapping test of multiple mediation was used to test whether information pooling and preference negotiation jointly mediated the effect of interventions on Task 1 decision quality. Because there was no direct effect of interventions on decision quality, the first of Baron and Kenny's (1986) criteria for mediation was not met. However, this analysis showed that the path from interventions to

unshared information pooled to decision quality was significantly greater than zero (95% CI: .27 – 2.59). Thus, H1c received qualified support.

Tests of the effects of Task 1 interventions on Task 2 processes and decisions were also conducted (all groups performed Task 2 without intervention). Although Task 1 interventions showed no impact on Task 1 decisions, they did have a lagged effect on Task 2 decisions. As shown in Table 5, in Task 2, groups who had received Task 1 interventions pooled more unique pieces of unshared ($F(5, 99) = 6.19$, $p < .01$)and shared ($F(5, 99) = 5.61$, $p < .01$) information and showed lower levels of preference negotiations ($F(5, 99) = 4.39$, $p < .01$) than the control groups. In addition, there was a main effect of the type of Task 1 intervention on Task 2 preference negotiation, ($F(1,99) = 4.61$, $p = .03$), such that groups receiving directive interventions showed lower levels of preference negotiation than those receiving participative interventions. Thus, H3c was not supported.

In Task 2, interventions significantly increased the group decision quality when controlling for pre-discussion preferences ($\chi^2(3) = 6.37$, p=.01) and when controlling for both pre-discussion preferences and Task 1 decision quality ($\chi^2(4) = 4.65$, $p = .03$). Omitting the control variables yields similar results ($\chi^2(1) = 5.74$, $p = .02$). However, there were no significant effects of the specific timing or type of intervention on Task 2 decision quality. Thus, H3d was not supported. In Task 2, this model also predicted group decision quality ($\chi^2(3) = 23.59$, $p < .001$); the effect of unshared information was marginally significant (*Wald* = 3.41, $p = .07$), while the level of preference negotiation was significant (*Wald* = 6.18, $p = .01$) in this model.

Preacher and Hayes (2008) bootstrapping test of multiple mediation was used to test whether information pooling and preference negotiation jointly mediated the effect of interventions on Task 2 decision quality. Steps 1-3 of Baron and Kenny's (1986) criteria have been shown in the analyses above. The effect of interventions on Task 2 decision quality becomes non-significant when controlling for information pooling and preference negotiations. Thus, all four criteria for mediation were met. In this model, there was a significant indirect effect of interventions on decision quality via preference negotiations (95% CI: .08-1.29), but not via unshared (95% CI: -.19 – 2.41) or shared (95% CI: -1.57 – .32) information pooling.

To better understand what might account for this lagged effect of interventions on Task 2 decision quality, 2-way ANOVAs were used to analyze the change in process variables from Task 1 to Task 2. There were no significant differences in information pooling change among conditions. However, groups receiving interventions showed larger decreases in their levels of preference negotiations in Task 2 than did control groups ($F(4, 100) = 3.98$, $p < .01$). Thus, the lower levels of preference negotiations may have contributed to the lagged effect of interventions on Task 2 decision quality.

DISCUSSION

The key findings of this study were that process interventions had immediate effects on critical group processes, but did not significantly improve decision quality during the task in which the intervention was received (Task 1). Surprisingly, in the subsequent task, the post-intervention processes continued to improve and, in this second task, resulted in better decisions, creating a lagged effect of interventions on decisions. The question, then, is why process interventions had only a lagged effect and did not immediately improve decision quality. Although groups did not pool more information in Task 2 than in Task 1, preference negotiation

levels were significantly lower in Task 2 (both overall and compared to only the post-intervention periods). Further, Task 2 preference negotiation significantly affected Task 2 decision quality. An indirect path from interventions to preference negotiations to decision quality was also found in Task 2, but not Task 1. Thus, during Task 2, groups 2 may have been better able to integrate the pooled information and alter their pre-discussion preferences because they were less likely to advocate for their preferences as they pooled information.

The null findings for the timing of interventions are more puzzling. Early and late interventions were equally effective in stimulating information pooling and reducing preference negotiations; those receiving early interventions had nearly twice as much time to pool information and use the new processes. However, those in the early condition did not differ significantly from those in the late in information pooling or preference negotiation, nor did they make significantly better decisions. Analysis of the video recordings of the groups suggest that Task 1 decisions cohered rapidly and interventions generally arrived too late to change them. In Task 1, nearly all groups began with members sharing their pre-discussion preferences and describing why they held those preferences. Information was shared for the purpose of justifying their preferences, not for the purpose of exploring alternatives. Through the process of publicly declaring or advocating for their preferences, members' commitment to (and evaluation biases in favor of) these preferences may have increased during the first five minutes. In the second task, however, groups were able to pool information with less advocacy, allowing the pooled information to shape their decisions.

This research supports the view that simple interventions can induce groups to share information both quickly and effectively (i.e. Okhuysen, 2001; Okhuysen & Eisenhardt, 2002). However, it also suggests an alternative interpretation of null findings of the impact of interventions on decision quality (e.g. Dennis, 2006; Klocke, 2009; Van Swol & Ludusky, 2007) – because they relied on single tasks, some or all of these studies may have dismissed effective interventions that could build groups' capacity for future decisions. Future research would be enhanced by examining the effects of interventions across multiple decisions in both laboratory and field settings to assess how a group's capabilities in decision-making changes over times.

This study also provides evidence that group processes can be more malleable than existing models predict. It is possible, as the Hackman and Wageman (2005) model implies, that groups are relatively impervious to interventions between the launch and the midpoint of their work together. However, it is not the case that decision making groups quickly form an intransigent process. The groups in this study were generally receptive to a new process that they sustained and improved into the next task. However, the early moments of group process impact how strong an intervention must be to shape the outcomes of the group's work together. In models of group process change, scholars and practitioners must account for emergent, countervailing and inertial forces when choosing whether to wait or to intervene right away.

Another important question is whether the same, simple intervention could have been used before the groups began work on the first task. Would groups have made better decisions in the first task, or was some collective experience necessary to understand and apply the new process? If the current intervention was, in fact, too late, is there a "right time" for such simple interventions for an in-progress group? Can these interventions be given too early? Through examining these questions, both scholars and practitioners can gain a better understanding of the role of time and timing in both group processes and outcomes.

REFERENCES AVAILABLE FROM THE AUTHOR