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Regulatory Complementarity and the Speed-Accuracy Balance in Group Performance

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Abstract

In this research, we varied the composition of 4-member groups. One third of the groups consisted exclusively of "locomotors," individuals predominantly oriented toward action. Another third of the groups consisted exclusively of "assessors," individuals predominantly oriented toward evaluation. The final third of the groups consisted of a mix of locomotors and assessors. We found that the groups containing only locomotors were faster than the groups containing only assessors, and the groups containing only assessors were more accurate than the groups containing only locomotors. The groups containing a mix of assessors and locomotors were as fast as the groups containing only locomotors and as accurate as the groups containing only assessors. These results echo findings at the individual level of analysis, and suggest that the *testing* and *action* components of operating systems independently contribute to performance both intra- and interpersonally.

Operating systems are often assumed to contain two functional elements: a *testing* component designed to evaluate a system's current state, and an *action* component designed to move it toward the desired state (e.g., Wiener, 1948). The thermostat has sensors to detect whether the desired temperature has been reached and a switching mechanism to activate or deactivate the heating or the cooling process. In humans, for example, low hydration levels detected by bodily mechanisms indicate that (the activity of) drinking is called for, and the detection of low blood glucose levels produces hunger that motivates eating.

Testing and action have been considered crucial to the operation of psychological systems (cf. Carver & Scheier, 1990; Kuhl, 1985; Miller, Galanter, & Pribram, 1960; Powers, 1973). The testing phase involves assessment of one's current goals and of the best available means to those goals. Subsequently, an action phase involves locomoting toward the desired objectives.

Typically, self-regulatory models have treated the *assessment* and *locomotion* functions as interdependent parts of a functioning whole. However, it is also possible for each of the two self-regulatory functions to be emphasized independently. From an individual differences perspective, the independence assumption implies the possible existence of individuals who are high in assessment and low in locomotion, low in assessment and high in locomotion, or high or low in both tendencies. From a situational perspective, the independence assumption implies that some psychological contexts may induce an assessment tendency in most

persons, whereas other psychological contexts may induce a locomotion tendency (for discussion, see Higgins, Kruglanski, & Pierro, 2003; Kruglanski et al., 2000).

Both assessment and locomotion contribute to achievement. Kruglanski et al. (2000) found that university students' grade point averages (GPAs) were affected by both locomotion and assessment. Specifically, there was a significant positive effect of locomotion on students' GPA, qualified by a Locomotion $\times$ Assessment interaction. Members of U.S. Army elite units exhibited an identical data pattern with respect to achievements during a demanding course of training (see Kruglanski et al., 2000). It appears that adequate levels of both locomotion and assessment are needed for successful functioning in diverse domains of individual endeavor.

In the work described here, we investigated how locomotion and assessment affect the functioning of groups. Groups, like individuals, can be thought of as operating systems that strive to accomplish certain (collective) objectives. The notion that groups locomote toward their goals was proposed by Festinger (1950), and has been considered a main reason why groups exert uniformity pressures on their members. The pressure to locomote may introduce systematic biases into group members' judgments and decisions: In their rush to locomote, members may disregard potentially relevant information at odds with the emerging consensus. Such biases should increase with increasing strength of the locomotion tendency among group members, and decrease with increasing strength of the assessment tendency. However, an excessive strength of the assessment tendency may forestall action, and therefore detract from the quality of group performance.

Thus, in the same way that a balanced presence of locomotion and assessment tendencies may contribute to performance within an individual's psychological system (Higgins et al., 2003; Kruglanski et al., 2000), a balanced group composition (i.e., inclusion of some people high in locomotion and others high in assessment) should contribute to performance within a group's socio-psychological system.

Our study included three experimental conditions. In the first condition, all group members were given a locomotion induction. In the second condition, all group members were given an assessment induction. In the third condition, half of the members were given a locomotion induction, and the remaining half was given an assessment induction. All groups performed a task with speed and accuracy components. We predicted that the groups in the all-locomotor condition would be faster than, but not as accurate as, groups in the all-assessor condition, and that groups in the all-assessor condition would be more accurate than, but not as fast as, groups in the all-locomotor condition. We also predicted that groups in the mixed condition would be reasonably fast and accurate, and thus have a superior overall performance on the experimental task.

METHOD

Participants

Participants were psychology students at the university "La Sapienza" in Rome, Italy. They volunteered for a study on "group psychology" and received course credits for their participation. A total of 180 students took part in the experiment. Participants were separated into 45 four-person groups; 15 groups were randomly assigned to each of the three experimental conditions. In the first condition, all group members received a locomotion induction. In the second condition, all group members received an assessment induction. In the third condition, 2 group members received a locomotion induction, and 2 group members received an assessment induction. All groups were homogeneous with respect to gender: Our sample included 10 homogeneous male groups and 35 homogeneous female

groups, divided approximately equally across the experimental conditions. Gender had no significant effect on our dependent variables, and is not considered further.

Procedure

Participants were seated around a table where group discussion was to take place. The experimenter then informed them that they would perform two unrelated laboratory tasks. The first task was to be performed by the individual, and the second task involved group deliberation. With participants' permission, the group deliberation was video recorded.

Manipulating Regulatory Mode—To induce the locomotion and assessment orientations, we followed a procedure devised by Avnet and Higgins (2003). Participants performed a “behavior over time” task in which they recalled three behavioral instances when they acted as locomotors or three instances when they acted like assessors. Both types of instance were taken from the relevant items in the Regulatory Mode Questionnaire (Kruglanski et al., 2000). For the locomotion induction, participants were asked to think back to the times when they acted like a doer, think back to the times when they finished one project and did not wait long before starting a new one, and think back to the times when they decided to do something and could not wait to get started. For the assessment induction, participants were asked to think back to the times when they compared themselves with other people, think back to the times when they thought about their positive and negative characteristics, and think back to the times when they critiqued work done by themselves or others.

Group Task—All study materials were translated into Italian and then translated back into English. The group task was originally devised by Stasser and Stewart (1992) and involved a “hidden profile,” in which different bits of evidence related to the identity of a guilty suspect were dispersed across the group members. Participants in groups read and reviewed evidence in a homicide investigation centered on three suspects: Eddie, Billy, and Mickey. Participants were instructed to discuss the case and reach consensus on the likely culprit. No time constraints were imposed.

Stimulus Materials—The stimulus materials included a series of police interviews containing 29 clues that were either incriminating or exonerating with regard to each of the suspects. There were 7 incriminating clues about each suspect, but also 4 clues that exonerated Billy and 4 clues that exonerated Mickey. The totality of the clues suggested that Eddie was the culprit. To create a hidden profile in each 4-person group, we provided only 3 of the critical clues to any given member. Specifically, each member received 1 incriminating clue about Eddie, 1 exonerating clue about Mickey, and 1 exonerating clue about Billy. Collectively, however, the 4 members of each group had all of the relevant information for reaching the correct solution.

Dependent Variables—Our dependent variables were discussion time, decision quality (correct, incorrect), and exchange of shared and unshared information. Two trained coders blind to the experimental hypotheses analyzed the videotapes to assess information exchange. Following the procedure of Stasser and Stewart (1992), we based our content analysis on the count of critical clues, noncritical clues, and irrelevant details mentioned during the group discussion.

RESULTS

Decision Time

We used the 4-person group as the unit of analysis. An analysis of variance (ANOVA) performed on the decision-time data revealed significant main effect of group composition, $F(2, 42) = 3.25, p < .049$. The assessor groups took appreciably longer on the average to reach a decision (31.60 min) than did the locomotor groups (19.33 min) and the mixed groups (19.93 min; see Fig. 1).

Decision Quality

A chi-square analysis performed on the decision-quality data (1 = *correct*, 0 = *incorrect*) yielded a significant effect, $\chi^2(2, N = 45) = 6.013, p < .05$. Twelve of the 15 assessor groups (80%) and 11 of the 15 mixed groups (73.3%) made the correct decision, whereas only 6 of the 15 locomotor groups (40%) made the correct decision.

To investigate whether decision quality stemmed from different amounts of time the three types of groups took to reach the decision, we performed two logistic regressions in which the three-level variable of group composition was represented by two dummy-coded variables. The first variable contrasted locomotor groups (coded 0) with assessor groups (coded 1) and mixed groups (coded 1). The second variable contrasted mixed groups (coded 0) with locomotor groups (coded 1) and assessor groups (coded 1).

When we regressed decision quality on group composition alone (locomotor groups vs. assessor and mixed groups; mixed groups vs. locomotor and assessor groups), only the first dummy variable (locomotor groups vs. assessor and mixed groups) received a significant weight, $b = 1.792, p < .05$, reflecting the fact that the locomotor groups manifested a poorer decision quality than the remaining two group types. When we regressed decision quality on both group composition (locomotor groups vs. assessor and mixed groups; mixed groups vs. locomotor and assessors groups) and decision time, the relationship between group composition and decision quality remained significant, $b = 1.954, p < .05$, suggesting that the mixed and assessor groups manifested better decision quality than the locomotor groups regardless of decision time.

Discussion Content

Twelve clues, unshared among the group members, were critical to demonstrating that suspect Eddie committed the crime. The remaining 17 shared clues, which collectively implicated the wrong suspects (Mickey and Billy), are referred to as noncritical clues. Moreover, there were 32 irrelevant facts mentioned in the stimulus information; these are referred to as details.

We used two coders to analyze the groups' discussions. The first coder listened to the audio recordings of each group's deliberations, and the second coder examined 20% of the discussion contents to afford a reliability check. Cohen's κ (Cohen, 1960), used to estimate coder reliability, was .75, indicating an acceptable reliability level (Bakeman & Gottman, 1997; Fleiss, 1981). Therefore, our subsequent analyses were based exclusively on the first coder's data.

As suggested by Stasser and Stewart (1992), we divided the number of times a group member mentioned a clue by the total number of times that all types of information (critical, noncritical, and details) were mentioned. Based on our content analysis, we examined the relationships between group composition and information processing and between content categories and decision quality.

Information Processing as a Function of Group Composition

With group composition as an independent variable, we carried out a separate ANOVA for each of the three types of content categories (critical clues, noncritical clues, and details). In these ANOVAs, the only significant effect of group composition emerged for critical clues, $F(2, 42) = 3.576, p < .05$, with assessor (.25) and mixed (.24) groups manifesting a greater proportion of critical clues than the locomotor groups (.17). We then performed an analysis of covariance on the critical cues with decision time as a covariate. The results of this analysis confirmed the previous significant effect of group composition found with regard to the overall decision quality, this time with respect to critical clues, $F(2, 42) = 3.420, p < .05$.

Relation between Information Processing and Decision Quality

Regressing decision quality on the three content categories (critical clues, noncritical clues, and details) yielded a significant weight only for critical clues, $b = 11.425, p < .05$; this result remained significant when we controlled for decision time, $b = 11.658, p < .05$.

Mediation Analyses

We investigated whether the effect of group composition on decision quality was mediated by the exchange of unshared information or critical-clue pooling by group members during their discussion. We followed the procedure outlined by Baron and Kenny (1986) for the detection of mediation. As noted earlier, we found that group composition had a significant effect on critical clues exchange and on decision quality. Moreover, our logistic regressions showed that the exchange of unshared information (i.e., of the critical clues) significantly influenced the decision quality. We further performed a logistic regression on group composition (represented by the two dummy variables) with critical clues as a potential mediator.

When we regressed decision quality on group composition (locomotor groups vs. assessor groups and mixed groups; mixed groups vs. locomotor groups and assessor groups) with critical clues exchange as the mediator variable, the previously significant group-composition effect (locomotor groups vs. assessor groups and mixed groups), $b = 1.792, p < .05$, was rendered nonsignificant, $b = 1.317, p > .10$. The Sobel test (Preacher & Hayes, 2004) showed that the reduction in effect size attributable to critical-clues exchange was significant, $z = 1.94, p < .05$. These results suggest that the relationship between group composition and decision quality was mediated by the exchange of unshared information or critical-clue pooling.

DISCUSSION

The all-locomotor groups were considerably speedier than the all-assessor groups, and the all-assessor groups were considerably more accurate than the all-locomotor groups. However, the mixed assessor-locomotor groups were as speedy as the all-locomotor groups and as accurate as the all-assessor groups, and had an optimal speed-accuracy trade-off in group performance.¹ The exchange of critical items among group members proved critical to decision quality (see also Stasser & Stewart, 1992). Such an exchange occurred to a significantly greater extent among members of the all-assessor and mixed assessor-locomotor groups than among the all-locomotor groups.

¹Although our locomotion induction might have primed the speed goal and our assessment induction might have primed the accuracy goal, the same inductions have been shown to produce a variety of effects unrelated to speed and accuracy. These effects were predicted by our theory (see Higgins et al., 2003).

Insofar as our results suggest the optimality of a combining locomotor and assessor modes for task performance, they echo similar findings at the individual level of analysis: Individuals high in both locomotion and assessment tendencies outperformed those not high in both tendencies. This finding is consistent with the notion that the testing and operation functions are applicable to many different systems, and that both individual self-regulation and group self-regulation constitute systemic phenomena governed in part by the same regulatory principles.

Finally, it will be of interest to examine the process whereby the locomotors and assessors arrived at their optimal performance in the mixed groups. For example, did the locomotors mitigate their locomotion tendencies and become more accurate in the presence of assessors, and did the assessors mitigate their evaluative propensities and become more ready to act in the presence of locomotors? Alternatively, did the mixed group composition encourage a “division of labor” in which the assessors performed most of the examination and the locomotors pushed toward a decision? These issues should be explored in future research.

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Fig. 1. Mean decision time as function of group composition. Error bars show standard errors of the means.